

# POPULAR Computing WEEKLY

## Acorn's Archimedes - RISC reviewed

see page 16

### NEWS DESK

Sir Clive Sinclair  
gets wafer cash

Bootleg Amigas

### HARDWARE

Magic Button

Utility interface  
for the Spectrum

### GAMES

Sentinel on the  
Atari ST

Death Wish 3

Cascade's ACE 2



ATARI

COMMODORE

SPECTRUM

SPECTRUM

AMSTRAD

COMMODORE

COMMODORE

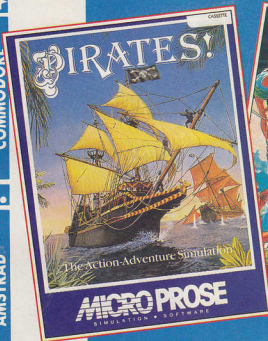
AMSTRAD

ATARI

ATARI

SPECTRUM

# NEW RELEASES



PIRATES

EPYX™ EPICS

## WOOLWORTHS

*A Great Deal in Entertainment*



\* At selected larger stores.

\* Items subject to availability

COMMODORE

SPECTRUM

AMSTRAD

# August 21-27

# CONTENTS

POPULAR  
**Computing**  
WEEKLY

## News

- 6 News Desk** Sir Clive Sinclair raises money to fund wafer project... Commodore warns against 'fake' Amigas.
- 31 Soundcheck** Mark Jenkins looks at a new range of music software from US company Sonus, now being imported into the UK and available for a wide range of machines.
- 32 Communications** Paul Fletcher brings you one of our occasional articles on American bulletin boards and what they have to offer.

## Features

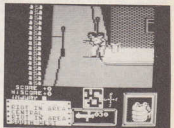
- 12 Magic Button** Follow Mick West's instructions, and build yourself a multi-utility interface for the Spectrum, all for around £7.
- 16 RISC technology** All the publicity surrounding the launch of Acorn's ARM, the Archimedes, has led to Reduced Instruction Set Computers being hailed as the next great computer development. Iain Fenton explains the thinking and practice behind RISC and its implications for tomorrow's micros.
- 18 Acorn's RISC machine** Kenn Garroch puts Acorn's Archimedes through its paces in our review.

## Programming

- 21 Learning Lisp** Kenn Garroch continues his series on Lisp with further examples of recursion, and explains how the lists that make up Lisp are put together to form meaningful data.
- 22 Listings** The final part of Discmon, the disc utilities program for the BBC B, is printed this week, and the Commodore 64 game, Space Blaster, also reaches its conclusion.
- We also have a Logo-style listing for the Spectrum, using a turtle and pen to draw pictures on the screen, and a fast machine code route for the CPCs, which will enable you to find the location of any hex or Ascii string in memory.
- 27 Bytes and Pieces** Short routines for you to type in.
- 29 Peek and Poke** Kenn Garroch answers your programming queries.

## Games

- 41 New Releases** Your complete guide to all the software released this week, including Cascade's ACE 2, follow-up to the acclaimed flight game, ACE, Gremlin's Death Wish 3, computer version of the Bronson film, and a peek at the forthcoming Atari ST version of Firebird's Sentinel.



**Editor** Christina Erskine **News editor** John Brissenden **Features editor** Cliff Joseph **Technical editor** Duncan Evans **Production editor** Michelle Beauchamp  
**Marketing and Advertisement manager** David Oxen **Advertisement executive** Athena Peerman **Classified manager** Susannah King **Classified executive** Robert Cole  
**Editorial secretary** Annmarie Allan **Administration** Carol Frith **Credit control manager** Gabriella Piccina **Managing editor** Peter Worlock **Publishing director** Jenny Ireland  
**Published by** Sunshine Publications Ltd, 12-13 Little Newport Street, London WC2H 7PP. Tel 01-437 4343 Telex 296275 Fax 01-439 0681  
**Typeset by** Magazine Typesetters, 6 Parnell Court, East Portway, Andover, Hampshire. **Printed by** McCorquodale Magazines, Andover, Hampshire.  
**Distributed by** S M Distribution, London SW9. Tel 01-274 8611, Telex 261643.  
 © Sunshine Publications Ltd 1987. ISSN 0265-0509

**ABC**

**How to submit articles** Articles which are submitted for publication should not be more than 2000 words long. The articles, and any accompanying programs, should be original. It is breaching the law of copyright to copy programs out of other magazines and submit them here - so please do not be tempted. We cannot guarantee to return your programs - so please do not send your only copy. **Accuracy** Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

**Popular Computing Weekly. Tel: 01-437 4343.**

## Business RISCs

What is the Acorn Archimedes meant to be? Certainly it is an achievement to get a RISC processor into a machine of its price but who is it aimed at?

It is surely too expensive for both the home and educational markets which leaves only business and specialist areas like CAD.

Both of these markets however are likely to be dominated by the new IBM PS2 which has stunning graphics and the massive advantage of being built by IBM.

There is also the question of supplied languages:

**Assembler** – by its very definition a RISC machine has a very simple instruction set requiring a large number of instructions to do something that a single CISC (Complex Instruction Set Computer, eg. 68000) instruction can do.

This is necessary to get the speed advantage gained by the pipelining techniques but makes it horrible to program directly.

**Basic** – this is only likely to be of interest to the home user who is lucky enough to be able to afford the machine. Why not supply a more widely used and structured language such as Pascal or C as standard?

I think that aforementioned people buying the machine would be willing to learn a new language in order to use their machine, and it would be much more useful to anyone intending to make a career in computers.

N A Ellerby  
N Humsbidge

Letter edited for length.

See page 16 for our in-depth review of the Archimedes and RISC.

## Wrong place for an argument

I feel compelled to write to you to comment on the topical subject of Amiga and ST bashing. Many people seem to go for the 'higher specification' argument for the Amiga, or the 'glut of software' for the ST. I am afraid to tell all Amiga owners that in the real world of computers, specifications mean little. Just look at the popularity of the IBM PC which isn't exactly state of the art but which holds the



"So this is the sophisticated, highly-sensitive technology Cocom's been keeping from us, is it Comrades?"

market for serious applications (why else would everyone want to clone it?).

The Amiga has fantastic graphics and sound, and indeed it is used in Arcade games. Sound like a games machine? Too right, I can really see a system design engineer or an accountant needing all that resolution, all those colours and the fantastic sound! In the real world I'm afraid to say that the Amiga is nothing more than a games machine, no serious businessman would or should touch it.

Finally I must ask why this debate must continue, nothing we say can alter the facts. Further, I doubt if the people set to buy these machines, ie businessmen, will even be reading such a magazine as this!

G Thulbourn  
Surrey

## Irresolute over resolution

I would be grateful for some advice, I would like to acquire an Atari ST or Amiga 500, and have a spare colour TV.

Is there any advantage (eg. picture quality) in getting a monitor as well?

If so, is there any advantage in getting a high resolution colour monitor, or is the resolution

predetermined by the computer?

H S Aziz  
Bishops Stortford

**Low resolution programs on either machine are adequately displayed by a TV screen (if you buy an Amiga or the Atari 1040STF, you'll need a separate TV modulator), but a monitor will give you a much clearer picture.**

**Buying a high resolution monitor will give you an even clearer picture still compared to a lo-res monitor. The difference isn't great, but definitely noticeable.**

## Which has sold the most?

I wish someone could tell me the truth about which home computer has sold the most machines, and thereby has the most software and hardware support, assuming this follows.

I feel the AmSpec Plus 3 will have the same support and longevity of all Spectrums and therefore be a better buy than a 6128 which doesn't seem to have the same level of support or even the cheap software. And now the Ataris will be £299 with disc mouse and monitor (but very little cheap software).

Or even the £256 has sold so many units that maybe that will be the most supported.

What would your advice be? All I want is a machine which will be better supported than the others. This I feel is reasonable as there must be a machine that has been the winner in this race. Is it a Spectrum or an Amstrad?

Surely there is a Ford Cortina of the computer world.

P J Morley  
Whittlesey, Cambs

**The computer which has sold the most in the UK is the Spectrum (in its many versions), followed by the Commodore 64.**

**Whether these two are currently outselling the rest is a moot point. Both are supported very strongly by independent companies, and this will continue for some time to come, because of the size of their user base.**

## User Group anniversary

I would like to inform other Popular readers that the United Amstrad User Group is one

year old in September, and to celebrate the occasion we are offering some unbelievable bargains to members.

Over the past year the group has grown into a very successful club offering many services including, a bi-monthly Newsletter, a Public Domain software library, software/hardware discounts and a computer book library. The membership fee is now £4 but if during our first birthday celebrations any readers would like to join then they can join for only £3.50 per year!

If any Amstrad CPC users are interested in the club, and want to know the kind of bargains on offer, then please send a SAE to United Amstrad User Group, 1 Magnolia Close, Fareham, Hants PO14 1PX.

Gary Carter  
Secretary, UAUG

## Memotech support group

It has occurred to me that with the Memotech MTX512 computer selling in vast quantities that there must be users out there not aware of a support group for the MTX.

The Memotech Owners Club has been founded for three years and currently has around 300 members. We produce 10 magazines per year and can offer a substantial library of software at £1.20 for two programs on cassette and £2.50 for around 20 programs on disc.

Subscription is annual and is £7.00. For fuller details our address is Memotech Owners Club, 13 Copse Road, Townhill Park, Southampton.

Alan Hamilton  
Southampton

## Spectrum user magazine

I and four of my friends are in the process of producing a new fanzine for the users of all Spectrums. It is called *Spectrum User* and costs 50p every two months and that includes p+p. We use a Spectrum 128 hooked up to a DMP 3000, Wafadrive and Multiface 1 (for the pictures!).

If any sensible *Popular* readers are interested in purchasing our illustrious mag then send the money to us at Spec-



trum User, 37 Raeburn Ave,  
Columbia, Washington, Tyne &  
Wear NE38 7DY.

Darren Green (Editor)  
Spectrum User

## Problem? What problem?

I know this letter may be a little belated, but I just read the Ziggurat column in the June 19 issue and have to let off steam and let my feelings known to the world.

Just to recap, the column was entitled "The Morality of Software" and was a sort of complaint against the games industry in general, regarding gory, sexy or nuclear-orientated games.

The question he seems to be asking is, "Should the software houses be treated like the video or TV markets and have a board of censors?"

At least, that is what it seems to be saying. It is the only solution to the problem he describes. The question is, is there a problem?

Mr Lewis seems to have fallen into the same trap as many people before him, that is, he has underestimated the intelligence of us consumers, or to put it another way, he thinks he's cleverer than everyone else. His pious attitude pours scorn on just about every game ever written. I have, myself, played quite a few "violent" games such as *Blood 'n' Guts* and am not affected in any way by it.

I do not consider the on-screen action as real so it doesn't affect me in the same way as watching a real person's head being lopped off (which I still find as repulsive as I always have). "At what cost to the young minds playing these games?" he says. Again he fails to give youngsters credit for their intelligence.

His second point is soft porn entering the industry. If you think about it, youngsters rarely take notice of such things until they are, say 12 years old. The two examples he gave (Maria Whittaker on the *Barbarian* ad and Sam Fox's *Poker* game) are not as "bad" as, say, a copy of the *Sun* (which said youngsters can buy in any newsagent).

As for *The Loathly Goddesses of Phobos*, this game is aimed at the mature adventure-

## King's side attack

In Game Two of our readers' *Colossus* chess tournament. The readers, playing white, have continued their king's side attack by bringing the queen to g5.

*Colossus* has defended by moving its pawn to f6: kicking the white queen.

Incidentally, our apologies for missing out some of the moves in our game guide a fortnight ago - we've filled in the blanks this week!

## Kicking back

What do you think the readers should do next?

Send your suggested move to either Inter-Mediate (*Popular Chess*), Freeport, Sawbridgeworth, Herts CM21 9YA

(no stamp needed) or *Popular Chess*, Unit 2, The Maltings, Sawbridgeworth, Herts CM21 0PG (with a stamp).

Only one vote per person please, and all entries must reach either address by Wednesday, August 19.

The move which gets the most votes will be entered into the game. Results and *Colossus*'s response will be published in two weeks time.

Next week: we return to *Game One*, where the readers are playing back.

## Game Two

The moves so far:

1 P2c-g4	PC7-c5
2 Ng1-f3	Ng8-e6
3 P2d-g4	Pc3-a4
4 Nf3d4	Pe7-a6
5 Ng4-f5	Pf7-a6
6 Ng5-d6	Bf8-d5
7 O2b1-c2	O2b8-c7
8 O2c1-d1	Ng8-e7
9 Ng1-c3	Pd7-b6
10 Ng1-c3	Ka8-g8 o-o
11 Bh1-e2	Bc8-d7
12 Ke1-g1 o-o	B18-C8

13 O2f1-d2	Nc6-d4
14 Hf1-d1	N44a2-e2
15 Ng3-e2	Rd1-c6
16 Bg1-g5	O2b6-e6
17 Bg5-e7	O2b6-e7
18 Ne2-c3	Bd7-e6
19 R2b-e4	O2f7-c7
20 Rd1-e3	R18-c8
21 Rd3-c3	Rc8-d8
22 Rd1-g1	Kg8-h8
23 O2d2-g5	Pf7-f6
24 ?	



## Psion warning

I would like, through the courtesy of your magazine to warn owners of the Psion Organiser 2 (model XP) who have had their Organiser for more than about three months and have only got the model with 16K of Ram and are thinking of purchasing the *Psion Spreadsheet* to take great care.

The only way that owners of the 16K Ram organiser can use the advertised 99 row by 26 col grid is to pay an extra £50 for the 32K upgrade which has to be fitted by Psion. This effectively makes the cost of the spread sheet £89.95 instead of £39.95.

Without this upgrade the memory available limits the spread sheet to a three figure entry (ie, 111) into 950 cells without the use of any formulae. If any formulae or headings are used the limit is even greater. This means that the size of the spread sheet is reduced from between less than a half to less than two thirds of its advertised size.

According to Psion, there is no alternative but to get the upgrade if you want to use a major part of the program because the battery powered 32K Rampack, which incidentally

you have to discard when the battery runs out because it is not replaceable, cannot be used.

Please do not think that I am in any way criticising the Spreadsheet as a program, because if you own the latest organiser with 32K Ram it seems that it would be first class. The only trouble is, because this has only been available for a few months the majority of owners only have 16K models. The above details, incidentally, are valid only if the diary is empty and there has been nothing saved to Ram. If there are any diary entries or information in Ram then there are even fewer cells available.

I M Fisher  
Croydon

## Oric User magazine

Please could you give a mention to a magazine called *Oric User Monthly*. Anybody interested should send an SAE and 55p for an issue to OUM, 10 Thomson Avenue, Kings Norton, Birmingham B38 8YD.

R Cook  
Birmingham

We're sorry but *Popular Computing Weekly* cannot guarantee to reply to all letters requesting a personal answer. It helps us enormously if readers are prepared to have general queries answered on these pages, so, if possible, please do not send SAEs.

# New mat avoids static

# Commodore warns of counterfeit Amigas

REDDITCH-based Praybourne Products has launched a new product designed to get rid of static electricity in computer systems.

The company's range of anti-static mats are placed under the keyboard and monitor, with a lead connected to a radiator, or other earthing point, to drain away excess static.

Praybourne claim that static build-up can cause odd characters to appear on screen, or corrupt programs. The mats come in various sizes and colours, and can be cut to shape without diminishing their effectiveness.

The mats cost £14.50 (8" x 10½"), £22.50 (8" x 20"), £34.50 (16" x 20") or £39.50 (25½" x 24"), plus postage and packing. Further information is available from Praybourne, Millsborough House, Ipsley Street, Redditch, Worcestershire B98 7BU, telephone (0527) 61221/61759.

COMMODORE last week warned people to be on the lookout for fake Amiga A500 machines, after a few hundred were reported to have entered the country.

The bootleg boxes are understood to have come from Europe, and are being offered to dealers at very low prices. Commodore doesn't yet know which dealers are handling the fake items, but as spokesman said: "If we knew, we would be taking things rather further."

So how can people tell the counterfeits from the real thing? Firstly, the fakes run on a 220V power supply, rather than a 240V supply.

Secondly, the counterfeit machines have forged A1000 warranty cards. These offer an on-site warranty service, and are printed in a "luminous" shade of red, unlike the real cards, which are printed in a duller shade.

"Commodore's stance is that we will not be honouring the



A500: accept no imitations

warranties, because the machines are not Commodore machines," the spokesman took care to point out.

"Our advice is go back to the dealer and sort it out with them."

The problem comes at a bad time for Commodore, which has just started a massive promotional campaign for the A500.

Commodore UK Consumer Division's sales manager Tom Hart was reported to be scath-

ing in his views of dealers handling the dud machines, and described them in last week's computer trade press as "unscrupulous dealers who cannot get a Commodore dealership, and are trying to make a fast buck".

The company is currently taking urgent steps, here and in Europe, to discover which dealers are stocking the machines, and where they came from originally.

## New from Thalamus

THALAMUS has announced the imminent release of *Quedex*. The game is the latest to be developed by Stavros Fasoulas, who was responsible for *Sanxion* and *Delta*.

*Quedex* is a maze game, with various puzzles in different sections, any one of which can be played at any one time.

## US collection

US GOLD launches a six-game compilation later this month, in an otherwise very quiet time for the games houses.

*Summer Gold* features *10th Frame*, *Impossible Mission*, *Rebel Planet*, *Dambusters*, *Bruce Lee* and *Beach Head II*.

The collection is available from this month on C64 and Amstrad CPC at £9.99, and Spectrum at £8.99.

# Sinclair gets backing for new superchip

SIR Clive Sinclair was reported this week to have won a major battle in his attempts to develop the wafer chip, a large "superchip" designed to replace the printed circuit board.

Anamatic, the Sinclair-owned company developing the chip, has finally obtained financial backing of £4 million from a variety of sources reported to include Tandem Computer, Barclays Bank, and a trio of venture capital firms - Advent, Baronsmead and Murray Johnson. The deal comes after over a year of discussion.

For Sinclair the wafer chip represents a long-held ambition. He has been developing

the chip for over five years.

The chip directly connects hundreds of small chips on the wafer, and so does away with the need to have them expensively mounted on printed circuit boards. Other firms which have tried unsuccessfully to do this have included IBM and Texas Instruments.

Sinclair would neither confirm nor deny the reports but is understood to be planning more powerful configurations of the technology, currently at prototype stage only.

If he is successful, the new chip should go on the market in some form or other next year.



Sir Clive Sinclair

# Shops wait for Plus 3 and Z88

CAMBRIDGE Computer's Z88 portable, and Amstrad's Sinclair Spectrum Plus 3 are both due to reach most retail stockists by September 1 - a full month later than planned.

The Z88 was initially delayed owing to problems supplying it to mail order customers. Those have now been rectified, and

had to be sorted out.

King would not be drawn on the question of insufficient production facilities, and whether this had contributed to the delay.

"I can make no comment on production lines. That would pre-empt an announcement," he said.



product was being stockpiled for Dixons and Comet, the largest stockist of the machine.

The next priority, according to Cambridge marketing manager Peter King, was organising distribution for the other UK retailers, including many independent dealers. Finally, overseas distribution arrangements

Meanwhile, the Spectrum Plus 3 is expected to be in all retail outlets by the beginning of next month, and indeed is already with Currys, according to an Amstrad spokesman.

This was originally scheduled for August 1 as well, but was delayed by a "shipment problem", the spokesman said.

## September launch for Atari printer

ATARI's new laser printer should be in the shops late next month with a £1,299 price tag, according to a spokesman for the company.

The unit forms part of Atari's desktop publishing system, along with the Mega ST range.

Eventually these will be available as a package, but Atari made it clear this week that the two are to be available separately, and that the printer will operate with any compatible micro.

For that reason no software will be bundled with the printer, but it will be fully compatible with the standard PostScript page description language, and DTP packages such as Mirrorsoft's *Fleet Street Publisher* and Softlogik/Silica Shop's *Publishing Partner*.

The spokesman said that the printer is currently undergoing British Standards Institute certification, and also awaiting an import licence.

## SOFTWARE HOTLINES

THE software companies, like the entire membership of the SDP, have gone on holiday in the sense that the new releases are few and far between. New products are generally being kept under wraps ready for (they hope) a triumphant unveiling at the PCW show in September.

This year, the PCW show is later than usual, opening on September 23 rather than during the first week, which means that the hanging around between the summer releases and the "triumphant unveilings" is rather longer this year.

Some companies, however, have been giving us a foretaste of what to expect, not least **US Gold**, which is launching a new label called **Go!**

The **Go!** games, which will be shown at PCW are a mixture of coin-op conversions, and licensed titles featuring characters from comics, popular toys, etc.

Details are currently available on games licensed from arcade publisher **Capcom**. USG has selected three of these, *Sideways*, *Speed Rumbler* and *Bionic Commandos*, for initial release under **Go!**

*Sideways* is no holds barred shooting as heroes Lieutenant Henry Sergeant Sanders battle it out against Bozon, who is, of course, intent on human extermination on a global scale.

*Speed Rumbler* has you harrying through the 21st century in a car, gunning down the enemy, freeing innocent hostages be-



**Knight Games**

fore your encounter with your terrorist adversaries holding your family and generally being unspeakably evil.

*Bionic Commandos* is more of the same type of scenario, but here you are equipped with a bionic arm, which enables you to hurl yourself around all parts of the screen.

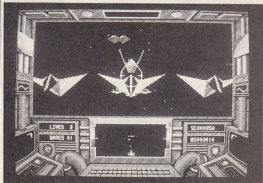
If you think there's too much violence in computer games already, I'm afraid it sounds as though you ain't seen nothing yet.

More shoot 'em ups courtesy of **English Software** are on the way. *Knight Games 2: Space Trilogy* (defend yourself against three different aliens in the final conflict) and Amiga and ST versions of *Leviathan*. English is also promising gentler things with the Amiga version of *Q-Ball*, the game which is sort-of-but-not-really snooker in a Rubik's Cube.

**Activision's** next contribution to defending the human race from certain elimination is *X-15 Alpha Mission*. You're at the controls of NASA's X-15, off to a space station occupied by yet more terrorists.

**Gremlin** also is not to be out done when it comes to you against the combined forces of darkness, with *3D Galax*, where the enemy are hordes of intergalactic pirates.

Christina Erskine



**3D Galax**

**MORE  
NEWS  
ON P.10**

# NEW AM NOW OTHER HOME COM

Amiga 500 is here.

With a mind-blowing array of features and capabilities.

And a £499<sup>2</sup> price ticket (ex VAT), hundreds of pounds less than anyone could have predicted.

"...a miracle of compression..." writes *Popular Computing Weekly*\* "...it all adds up to a formidable system which is clearly better than anything else at the price."

This elegant little machine takes family computing into new dimensions of creativity, excitement and productivity.

It outruns and outguns office PCs as a business multi-tasker, performing a deskful of different jobs simultaneously, at over 7 million steps per second in realtime.

So other home computers may not be the only machines it consigns to the toy cupboard.

## AMAZING SCIENCE FACT!

Amiga is used by Disney, Universal and other Hollywood studios for its dazzling 3D graphics manipulation and animation powers.

A sophisticated high-speed graphics processor called a blitter chip transforms images in realtime.

You can paint the screen with more than 4,000 colours. Create and modify designs and effects as you like, with pin-sharp resolution.

You command an almost limitless workshopful of stunning professional graphics capabilities.

With an optional Genlock interface, you can capture images off videotape. Manipulate and mix



them with graphics. Then re-transfer them to videotape!

This means you can produce spectacular special effects like those created by Amiga computers for Channel 4's *Chart Show* and the American TV science fiction series *Amazing Stories*.

## YOU AIN'T HEARD NOTHING YET

Concealed within the sleek Amiga shape, there is also a pro-quality sound synthesiser and four-track stereo sound system.

Driven by another powerful and unique custom chip, it can synthesise musical instruments and

<sup>2</sup>Includes DeluxePaint from Electronic Arts worth £79 + VAT! (Excludes monitor or TV modulator.)

# AMIGA 500. COMPUTERS ARE JUST TOYS.



sound effects.

An optional digitiser allows you to take onboard real sounds. Mix and modify the two. Translate your compositions from keyboard to sheet music. Play them back through the monitor's speaker or your hi-fi.

Your Amiga can also synthesise the human voice.

It can speak back anything you care to write on the keyboard.

So this is one computer that can not only word process with faultless professionalism, and incorporate superlative graphics into the text, it can also read the text back to you aloud.

## GAMESMANSHIP AND WORKMANSHIP!

The new Amiga 500, in fact, dumbfounds its competitors in every way.

Graphics, stereo sound, multi windowing, multi screens, 512K to 1Mb RAM (expandable by an incredible 8 further megabytes externally\*\*), 3½" internal disk drive with 880K of mass memory, 4 unique dedicated chips plus the 16/32-bit power and 7.14MHz speed of its central processor, communications and vast expansion potential all add up to a computer of immense professional capability.

Yet the same technology allows the Amiga 500 to play games so mind bending that only full-scale arcade machines

have been able to play them until now.

## AND AMIGA MEANS 'FRIEND'!

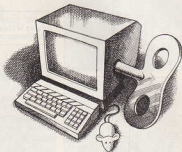
However many of the Amiga's extraordinary talents you find yourself using, they will all be beautifully simple and natural.

You will be totally at home in the friendly and effortless Amiga

environment, where everything happens by windows, icons, mouse and pulldown menus.

And the Amiga 500 simplifies life in another way too.

There is now no comparable home computer. At any price.



Try the astonishing new Amiga 500 at your nearest Commodore Amiga dealer.

And discover why *Personal Computer World*\*, having tested the graphics performance of Amiga's latest and most powerful rival, concluded "...Amiga still reigns supreme..."



# Commodore

\*Popular Computing Weekly, 22-28 May 1987. / Personal Computer World, February 1987. \*\*Subject to availability.

AMIGA IS A TRADEMARK OF COMMODORE - AMIGA INC. © 1987 COMMODORE BUSINESS MACHINES (UK) LTD. ALL RIGHTS RESERVED.



# Microprose in Pirates dispute

A DISPUTE between Microprose and Cascade over two games featuring pirates appeared to have reached stale-

mate last week, with both sides claiming foul play.

The affair began last month, when Microprose sought an injunction over the packaging of Cascade's *Pirates of the Barbary Coast*, and claimed it was too similar to the packaging for its recently-released *Pirates*.

"We do not think there's any

similar. We have used Letraset which happens to be similar, and the copyright for that rests



Similar packaging? Cascade's *Pirates of the Barbary Coast* (left) and Microprose's *Pirates* (right)



confusion about the game," said Microprose UK head Stewart Bell last week. "Our concern is purely about the logo on the boxes."

Bell wasn't prepared to comment any further, as the matter is now with Microprose's lawyers.

But Cascade has been vociferous in defence of its position, and marketing director John Lewis published a letter in *Computer Trade Weekly* immediately following the injunction, explaining his side of the affair.

Last week, Lewis commented, "Microprose are a very powerful American company who are trying to use heavy handed methods to stop us selling our game," he said.

"Ours was out first, and in any case the packaging isn't

with Letraset, not Microprose or anybody else."

Lewis added that to date Cascade has received no direct notice of any legal action over the affair.

"Where's the injunction, Microprose? All we've had so far is various threatening letters from their solicitors, it's a big bluff, and they know they haven't got a leg to stand on. They tried to frighten us, and it hasn't worked," he said.

Lewis made it clear that if and when the matter reached court, Cascade would fight to retain its packaging, and would be considering "other things we could do" in the meantime.

## KINGSTON CID APPEALS TO AIR CUSTOMERS

THE investigation into the affairs of Ahmed Innovations and Research last week appeared to be heading nowhere. And police and trading standards officials have made an appeal to disgruntled AIR customers please write in.

A number of people contacted the News Desk after ordering an ST emulator - the *STimulator* - from the firm by mail order, and receiving nothing in the post.

The matter was put in the hands of Kingston Trading Standards service, and its officials have now alerted police. But Detective Constable Burch of Kingston CID admitted that they needed written complaints from members of the public before any progress would be made.

"We've had one or two complaints about this company," he said. "The last thing that happened was that it was put in the hands of the VAT people, and they were going to see what was going on," he said.

Burch added that if people waiting for goods or a cash refund wrote to the police or the Trading Standards office, they could then confront AIR boss Hassan Ahmed.

Meanwhile Ahmed is understood to be back in this country after a brief visit to the United States. Last month he claimed that he had sold the rights to the ST emulator to an American company, PAD Investments, of Houston, Texas.

Ahmed also told a customer that he had sold the same rights to another American company, Technic. But when *Popular Computing Weekly* telephoned the number given for Technic by Ahmed, it turned out to be a doctor's office.

Anybody who is owed money by AIR, or who has other information, should write a detailed account of what they know to either E R Forsythe, Trading Standards Office, Guildhall, Kingston-upon-Thames, Surrey KT1 1RV, or D/C Burch, CID, Kingston Police Station, 5-7 High Street, Kingston-upon-Thames, Surrey.

## NEXT WEEK

### Electronic Arts

One of the top US software companies, Electronic Arts has had an office in the UK for some months, and will officially launch EOA UK next month.

The company already has a reputation in the UK for high quality games, and next week, we'll be previewing its first UK range of 26 titles, and showing you what Electronic Arts has to offer the British games player.

### Learning Lisp.

Kenn Garrock continues his guide to Lisp, and takes you further into using and programming in the language.

### Video titling

The gremlins got at us again, I'm afraid and we couldn't print this feature this week as promised. Fingers crossed that Chris Jenkins will indeed be looking at this package which will put captions on your video pictures.

## Protext cut for PCWs and ready for PC

ARNOR has been making moves with its *Protext* word processing package.

The company has announced a version for the IBM PC and compatibles, plus a price cut for the PCW version.

The PC version will cost £59.95, and includes Arnor's spell checker and mail merge programs. Arnor's David Fisk

hopes that the comparatively low price (for a PC wp) will attract buyers, particularly those with a low cost PC compatible machine.

The PCW version of *Protext*, which also runs on the CPC6128 under CP/M Plus, has been cut from £79.95 to £59.95, in line with the PC version's price.

# Iron Curtain export rules to be relaxed?

THERE may be increased opportunities for UK and European computer companies to export personal computer equipment to Iron Curtain countries from September.

That is when the 15 nation Co-ordinating Committee for Multinational Export Controls (Cocom) is expected to announce an updated list of restricted Western goods.

Under the review, a large number of computer goods previously considered too sensitive for export to Communist countries, is expected to have export restrictions lifted.

Reports last week suggested that items affected could in-

clude the Apple II, IBM PC XT and AT, although the Personal System/2 is unlikely to receive the go-ahead.

The announcement is part of an attempt by the committee to reduce the number of restricted items, in order to make compliance with the policy easier to enforce. The United States in

particular has attracted criticism from several European quarters for its aggressive demands in restricting exports to the Eastern bloc.

But Cocom, which operates under the auspices of the United States embassy in Paris, was unwilling to comment on any announcement last week.

## DIARY DATES

### AUGUST

22 August

#### ZX Microfair

New Horticultural Hall, London SW1

**Details:** Latest innovations for Sinclair users

**Price:** £2.00/£1.50 on door, £1.50/£1.00 advance

**Organiser:** Mike Johnston 01-801 9172

### SEPTEMBER

23-27 September

#### Personal Computer World Show

Olympia, London

**Details:** Latest hardware, software and peripherals for business and leisure computing

**Price:** £3, £2 - (parties over 10)

**Organiser:** Montbuild 01-486 1951

### OCTOBER

15-17 October

#### Desktop Publishing Show

Business Design Centre, London

**Details:** Demonstrations of latest hardware and peripherals, plus seminars and user clinics

**Organiser:** Database Exhibitions, 061-456 8383

### NOVEMBER

14 November

#### National Einstein Exhibition

National Motorcycle Museum, Birmingham

**Details:** Einstein software etc.

**Price:** 50p

**Organiser:** UKEUG (0473) 49507

Prices, dates and venues of shows can vary, and you are therefore strongly advised to check with the show organiser before attending. We cannot accept responsibility for any alterations to show arrangements.

## HMV shop takes on games software



GAMES players shopping in London's Oxford Street now have another large store worth a visit. The HMV store at 363 Oxford Street recently opened a games department on the first floor, and HMV claims it's the biggest range of software entertainment in Oxford Street.

## Mansell to endorse Grand Prix game

MARTECH is confident of Nigel Mansell winning the 1987 Formula One World Championship - so confident that it will be releasing Nigel Mansell's Grand Prix on November 19, four days after the last race in Adelaide.

The game will be available on all major formats, and prices are expected to be announced shortly.



## MasterScan aims to turn PCW into a fax machine

DATABASE Software is releasing a scanner for the PCW machines, the operation of which give the PCW's facsimile-like abilities.

The MasterScan, fitted to the PCW's bundled printer, will automatically transfer text and illustrations to the computer screen.

The fax-style operation comes into play if you have a modem and software, since the

contents of the screen can then be transferred through the modem to a separate PCW.

Scanned copy or graphics from the printer, once transferred to the screen can also be incorporated into your word processing documents or used in conjunction with desktop publishing packages.

MasterScan costs £69.95. Details from Database Software on 061-429 8008.

# DIY MAGIC FOR YOUR SPECTRUM

Mick West demonstrates how you can alter your Spectrum 48K to allow you to break into programs, examine and alter memory, disassemble sections of the program and much more – all at the touch of a button.

**T**his article shows how you can make yourself a 'magic button' for the Spectrum 48K. This button, when pressed, will allow you to break into any program, examine and alter the memory, disassemble any section of the program, save a screen, hack it about as much as you want and then carry on where you left off. There is even a free arcade game thrown in!

There is only one snag with this, you need to have some experience with a soldering iron, or to persuade a friend who has to do it for you.

## Components

First of all you will need:  
 one Eprom with the Magic Button software on it  
 one 28 pin integrated circuit (IC) socket  
 one 74LS27 Triple 3-input NOR chip  
 one 74LS32 Quad 2-input OR chip  
 one 74LS74 Dual D-type latch chip  
 one bit of stripboard (eg Maplin Vero 14354 63x25mm)  
 one push to make switch (the magic button)

Some thin insulated wire for making general connections, a soldering iron, a Philips screwdriver, wire cutters

This is all available from any good electronics supplier (eg, Maplins) except the Eprom which you have to obtain from me, Mick West – details later.

Before starting it is a good idea to read all the way through these instructions so that you know what you are letting yourself in

**"Before starting, you are advised to read all the way through these instructions so that you know what you are letting yourself in for: then you will have no problems"**

for. Neither I nor *Popular Computing Weekly* can accept any responsibility arising from the use of these instructions. If you are careful and you follow the instructions properly, then you will have no problem.

Note: all chips are numbered anti-clockwise, starting at the top left of the chip with pin one and ending on the top right. The top of the chip is the end with the U-shaped indentation.

**Step 1.** Open up the Spectrum by removing the five Philips screws in the base and taking off the keyboard, which will then leave the circuit board exposed.

**Step 2.** Locate the Rom (this is fairly easy). It is the only chip on the board with 28 legs, about one centimetre smaller than the big two. In Spectrum issue one and two it's by the edge connector.

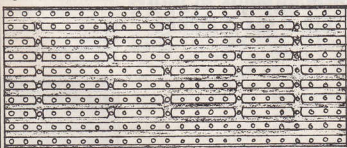
**Step 3.** The tricky bit. Take the IC socket and locate legs 27 and 22 and bend these so that they are at right angles to the rest of the legs, pointing outwards. You now have to solder the IC socket on top of the Rom. There are two possible ways of doing this. If the Rom is already in a socket then remove it, stick it in a piece of cardboard and then solder the socket on and put it back in its socket.

If, like me, your Rom is soldered into the board then you will just have to press the socket on top of the Rom so that it sits there fairly firmly, then solder diagonally opposite corners to secure it in place. Then solder the other legs using a minimum of heat, but ensuring that a proper connection is made.

**Step 4.** With a sharp implement cut the track leading to pin 22 of the Rom. This will be on the underneath of the Spectrum's PCB so you will have to unscrew it completely from its case. When you have cut the track then solder a wire about 15 cm long to the disconnected pin.

**Step 5.** Solder a wire link from pin one to pin 28 of the Rom (the two top pins) and another one from pin 28 to pin 27 of the

Fig. 1



Eprom which you bent out before.

**Step 6.** With a sharp knife cut the copper tracks on the vero in the places indicated in fig. 1. Make sure that the track is fully cut on both sides of the hole and that there are no loose bits of copper that could short two tracks together.

**Step 7.** Turn the vero over and insert the chips in the places indicated in fig. 3. Make sure that the U-shaped indentation is at the top of the chips. Check that you have the vero the right way up so that the cut tracks will be under the positions marked by Xs.

**Step 8.** Solder the legs of the chips on to the copper tracks. The best way to do this is to apply a small amount of solder to the iron and then hold it so that it touches both the chip leg and the copper for a couple of seconds. Then apply some more solder.

Allow this to flow all the way round the leg and then remove the iron and solder at the same time. Make sure that the solder does not bridge tracks.

If you do get solder across two tracks then wipe the iron free of solder and then reheat the offending solder and it should flow back onto the tracks and the iron.

**Step 9.** There are nine connections on the vero that are internal to it. Do these now. You must use insulated wire for all of these connections. Cut the wire to the right length and strip about a half centimetre of insulation from each end and twist the strands together. Now heat the end of the wire and allow some solder to flow over it. This is called 'tinning'. Put the ends of the wire through the appropriate holes as indicated in fig. 3 and solder them to the copper tracks as you did for the chips. Clip off any excess length of wire.

**Step 10.** Now for the external connections. The board will eventually sit over the six small logic chips in the middle of the computer so use this as a guide when deciding the lengths of wire for these connections.

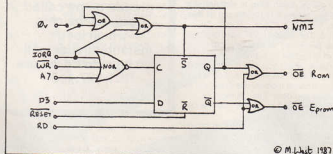
All but two of the connections are soldered directly to the Z80 chip's legs, the other two being connected to the Rom/ socket's legs. The numbers next to the connections in fig. 3, refer to leg numbers.

The connection to the vero is the same as before. The connection to the chip requires a little more care. The wire must be tinned as before. The leg of the chip will already have a thin layer of solder on it.

Hold the wire against the relevant chip leg and then press it on with the iron, holding it there for about two seconds then remove the iron but still hold the wire firmly against the chip leg to allow the solder time to set. This sounds tricky but is in fact very easy once you have done a couple. It helps, as before, for the iron to have a small amount of solder on it while doing this. Also keep the iron free from dirt.

Be especially careful of dropping solder on the main circuit board. This could seriously damage your computer so check very carefully. The Rom 22 connection is connected to the piece of wire you soldered to pin 22 of the rom underneath the board. The Eprom 22 connection goes pin 22 on the IC socket which is sticking out. Ensure that the

Fig. 2



two pins do not short out.

**Step 11.** The magic button! Solder two fairly long wires to the button and connect these to the vero as shown in fig. 3.

**Step 12.** Nearly finished. Check all connections carefully for shorts. If any of the soldering looks a bit messy or lumpy then reheat it to let it flow around the connection better. Cover the bottom of the vero board with generous helpings of insulating tape so you don't blow up the computer.

**"When you press the magic button you will get a distinctive border. If you then press any other key, you will get a menu containing four options"**

Plug the Eprom into its socket, with the indentation at the top like all the other chips. Put the vero in place over the six small chips and replace the keyboard, leading the wires for the magic button out through one of the holes in the back of the computer. Replace the keyboard and the screws.

**Step 13.** Disconnect any peripherals (except interface one) and switch on. The computer should work as normal. And now the bit you have been waiting for - Press the magic button! The border should light up with a pretty pattern. If you have got this then it has worked and you should go off and read the section on how to use it. If not, then you have got problems, so go to step 14.

**Step 14.** If the computer does not work normally, check all the connections, especially the ones which connect the IC socket to the Rom. Check that you have got the pin 22 connections the right way round. Check

for drops of solder everywhere.

If it still does not work at all then desolder the vero completely and repair the track you cut. If it still does not work then I am afraid you have broken your Spectrum and it will have to be sent off for a short holiday to your friendly micro repair company, explaining what you have done. If, however, it works without the circuit then that is what is wrong. So check it again, then go back to step 13.

**Step 15.** If nothing happens when you press the button then go on to step 16. Otherwise, your problem is almost certainly the soldering of the IC socket to the Rom. Check this very carefully. Reheat each joint to allow the solder to flow a bit more. If it still won't work, then go to 16.

**Step 16.** Check that the button works. If you can't do this then cut it off and try just touching the wires together to make the connection. If the button is fine then one of your connections must be at fault. Check that all the wires go to the right places. Check all the solder connections. Check the chips are the right way up as shown in Fig. 3. Then go back to step 14.

## Using the button

Press the magic button. You will get a distinctive border. If you now press S then a SCREEN\$ will be saved to tape under the name 'A PICTURE' and then the program will carry on as normal. If you press any other key you will get a menu of four options.

**Option 1.** This will simply restart the program from the point you left it. Use this after hacking, etc.

**Option 2.** The back-up program (see note below). This is used for saving the program to tape or Microdrive. You will be presented with a self explanatory menu. Option 4 lets you put in pokes in decimal. Option 5 lets you set the border colour as it is impossible for JR to work out what this is by itself. Also you can have an optional 'press a key' message.

**Note that these saved copies of the**  
continued on page 14 ►



◀ continued from page 13

program can only be loaded into the computer which saved them, with the chip in place. Each chip is individually coded to prevent any illegal use of this device.

**Option 3: The Hacker.** On selecting this you are presented with a hex and Ascii dump of a section of memory. There is a white cursor which you can move around with the shifted cursor keys. For quick skimming through memory use *Enter* and *P* to move up and down through memory.

There are various single key commands for use with the hacker:

**N** - new address. Type in the new address. This must be four hexadecimal digits (eg, 7FE2).

**A** - alter bytes at the cursor in Ascii. Just type in what you want and press return. Useful for customising messages in games etc.

**H** - alter bytes at the cursor in hexadecimal.  
**S** - search for the first occurrence of two bytes. Type the bytes in without a space (eg 3E04) and press enter. The display will move so that the first occurrence of the two bytes is at the top of the screen. Experience has shown that you always look for two bytes. It is either an address or LD A,n.

**F** - find the next occurrence. After using *S* use this to find all the next occurrences of the two bytes. Just press it and the display will move to the next occurrence. Repeated presses will eventually step through all the occurrences in memory.

**D** - the disassembler. You will get a page of disassembly from the address at the top of the hex dump page. Press enter to get the next page. Or type in a new four digit address to disassemble from somewhere completely different. To exit from the disassembler press the space key.

**Q** - this returns you to the main menu.

**Option 4.** This will attempt a return to

**"There is a small arcade game called Dotty on the chip, which loads instantaneously. All you have to do is type OUT 127,11,"**

Basic. It will work with most programs written in Basic and some machine code games, but usually it will just reset the computer.

## The Game

Totally free there is a small arcade game called Dotty on the chip, which loads instantaneously. All you have to do is type OUT 127,11 (OUT is Extended shift-0). The controls for the game are Q: left; W: right; space to fire. It is also compatible with Sinclair and Cursor joysticks - but not Kempston, despite what it may say on the main screen.

The idea of the game is to shoot the wiggling pixels whilst avoiding the bouncy ones before the time runs out. It sounds simple but is quite addictive and has ten levels of varying difficulty.

A note on compatibility. The magic button is fully compatible with Interface one and Microdrives, just as long as you don't press it while the micro drives are actually going round. Anything else I'm not sure about.

The saving is done from Basic so it may be compatible with disc drives which use Microdrive syntax - but I'm not sure if the

hardware will interfere.

The problem is that there are only three free ports on the Spectrum and other peripherals software may page the Eprom in at the wrong time or the magic button software may do things to the external peripherals.

The first problem can be solved by desoldering the wire from pin 8 of the Z80 and connecting it to any hole in the second row up from the bottom. This ensures that the Eprom can only be paged out from software and thus renders it invisible to any peripherals when it is not being used.

This unfortunately means that you cannot now load in any programs you may have saved with JR and that you cannot get to the game any more. The solution to this is to install a switch so that the input can be connected to either pin 8 of the Z80 or to the hole. The second problem can only be solved by removing the offending peripheral.

Fig. 2 shows how it all works. The main thing being the D-type latch which selects either the Rom or the Eprom by only allowing the RD signal through if it is selected. It will get through to the Rom if Q is low, ie, the latch is off.

The Eprom is similarly activated when Q-bar is low, ie, the latch is on. Initially the latch is reset by being connected to the Z80's RESET pin which is active when the computer is switched on. When you press the button then, as the other input is connected to Q-bar, the output from the first OR gate will go low.

When the computer is not accessing memory then IORQ will go low, thus allowing the output from the second OR gate to go low. This sets the latch on, paging in the Eprom, and activates NMI. This forces the computer to stop what it was doing and jump to address 102 in the Eprom. That is the entry point for the magic button software.

The EPROM is paged from software by OUT 127,n: where n is either 3 to page it out or 11 to page it in. This out is decoded by the three input NOR gate.

## Where to obtain the kit

The Eprom and components are available from me. There are two ways of doing this. Either you can get the Eprom from me and the bits yourself or you can get a full kit from me.

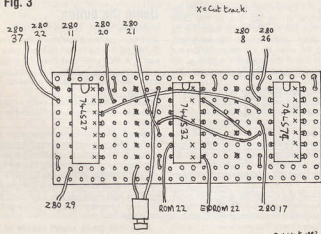
## Prices

Fully programed Eprom £5.00  
Eprom and other bits £7.00

The address is: Mick West, 27 Lynton Drive, Shipley, West Yorkshire BD18 3DJ, from August 28 onwards.

Please note, that if your Spectrum is still under guarantee, opening it up to begin this project and any alterations you make to the components will render your guarantee void.

Fig. 3



© M. West 1987



# THE ALLTIME GREATEST 10 Game COMPILATIONS

An outstanding collection of the best hits from the best software houses. Not just a good buy because of its amazing value for money, but also because the proceeds of all sales are to be donated to the National Society and the Royal Scottish Society for the Prevention of Cruelty to Children.

10 GREAT GAMES FOR  
SPECTRUM  
48K

£9.99

## KIDSPRAY

THE BACK PACK COMPILATION

XENO (ANF Software)

BOUNTY BOB STRIKES BACK  
(US Gold)

MAILSTROM  
(Ocean Software)

DEACTIVATORS (Ariolasoft)

STARSTRIKE (Realtime)

NIGHT GUNNER (Digital Integration)

LUNAR JETMAN  
(Ultimate Play the Game)

MAIRSPORT (Gargoyle Games)

STARION (Melbourne House)

MONTY ON THE RUN  
(Gremlin Graphics)

ALL PROCEEDS TO THE NSPCC & RSSPCC

A FUN  
FILLED WAY  
TO HELP OTHERS.....  
IT'S KIDSPRAY

10 GREAT GAMES FOR  
CBM 64

£9.99

## KIDSPRAY

THE BACK PACK COMPILATION

XENO (ANF Software)

BARRY McGUIGAN'S BOXING  
(Activation)

DEACTIVATORS (Ariolasoft)

BOUNTY BOB STRIKES BACK  
(US Gold)

SPINDIZZY (Electric Dreams)

STARION (Melbourne House)

BOUNCES (Beyond Software)

ELECTROGLIDE  
(English Software)

MONTY ON THE RUN  
(Gremlin Graphics)

SKYFOX (Electronic Arts)

ALL PROCEEDS TO THE NSPCC & RSSPCC

10 GREAT GAMES FOR  
AMSTRAD  
128K

£9.99

## KIDSPRAY

THE BACK PACK COMPILATION

XENO (ANF Software)

KNIGHTSHARE  
(Ultimate Play the Game)

NOMAD (Ocean Software)

DEACTIVATORS (Ariolasoft)

MAIRSPORT (Gargoyle Games)

NIGHT GUNNER (Digital Integration)

STARSTRIKE (Realtime)

TEMPEST (Electric Dreams)

STARION (Melbourne House)

MONTY ON THE RUN  
(Gremlin Graphics)

ALL PROCEEDS TO THE NSPCC & RSSPCC

YOU HAVE THE FUN...!  
THE NSPCC/RSSPCC  
HAVE THE PROCEEDS

BACK - Battle Against Cruelty to Kids. The 1987 software industry charity promotion in support of the NSPCC & RSSPCC. BACKPACK - A compilation of 10 first class software games donated free by software companies.

KIDSPRAY thanks the following companies for the generous donation of their services: CAML ADVERTISING, G & L SERVICES, HOWLEY STUDIOS, TRIANGULAR STUDIOS, PRE-PRESS SERVICES, CRYSTAL DESIGN, AMBERLAND, STEEL SPLASH, PRINTING CENTRE, LINE PRINTERS, WALLBOND BROTHERS, D & L GAMING, THE GAMES FACTORY.

# LOOKING AT THE RISCS

Iain Fenton discusses the whys and wherefores of RISC computers, and looks at how the concept evolved in the first place.

Many of you will have recently seen the launch of the Acorn ARM machine (ARM standing for Acorn RISC Machine), and wondered what all the fuss about Reduced Instruction Set Computers (or RISC for short) were, or why they are receiving so much attention in the computer press recently. In this article, I hope to show the advantages and ideas behind RISC computers as they are today.

As modern microprocessor-building techniques advanced, so it became possible to put more transistors (the building-blocks of all CPUs) onto each piece of silicon. The original Intel 8088/8086 CPU which is at the heart of the IBM PCs and the Amstrad PCs has about 80,000 transistors on it, while the next generation 80286 (in the IBM AT and compatibles) has around 150,000.

The Motorola 68000 (used in the Apple

Mac, Commodore Amiga and Atari ST series) has over 190,000, and the current state-of-the-art CPU, the Intel 80386, has over a quarter of a million transistors.

As these chips increased in size and complexity, so did the instructions that they processed. The new Acorn RISC chip however, has only around 25,000 transistors on it, hence making it considerably cheaper to manufacture than the other more complex chips of its competitors.

## Current complex computers

The most sophisticated of today's microcomputers, such as the Compaq 386, or the Apple Mac II have some very complex instructions for their CPUs to operate, such as segmenting memory for multi-tasking, and protecting memory from over-writing itself when two programs both ask for the screen at the same time, or for converting strings of text characters into decimal numbers.

The architecture of the current crop of CPUs reflects this attempt to build complexity in at the lowest level. It has been shown however, that these long instructions are not used as often as was thought, and the complexity in chip-design and space needed to accommodate these instructions has slowed CPUs down unnecessarily.

The operating systems on these computers spend about 90% of their time doing very simple instructions, such as loading a number into a memory location, branching on a result to another location, and adding two numbers in memory and storing the result somewhere. This is not very efficient on a chip expecting, and set up for, a large, complex instruction. Whilst a 32-bit chip may be waiting for a 32-bit instruction, it has to read in 4 bytes (ie, 32 bits) in order to process the data.

One British Risc chip implementation is the Immos Transputer, and as it only has a very small number of instructions these can be fitted into only one byte, hence when running simple instructions the Immos chip will be able to spend much less time waiting for instructions than a chip expecting longer instructions will have to.

## Clock Cycles

All computers have a predefined 'clock cycle' (like the heart-beat in a human being), and the speed of the cycle regulates how fast the computer can work. There are a number of 32-bit microprocessors on the market - the Intel 80386 (as in the Compaq 386, and the new IBM PS/2 model 80) and Motorola 68020 (as in the Apple Mac II) are but two examples, and in general the complex instructions sent to these chips will take between three and ten clock cycles to complete.

As the CPU has to deal with varying length instructions, it becomes difficult to keep a smooth flow of data and instructions going through the chip without using sophisticated pipelining, and special low-level hardware to ensure the next instruction to be processed is in the pipeline waiting when needed.

One of the main design principles with a RISC chip is that each instruction that the CPU has to handle can be processed in a single clock-cycle. Hence in a RISC CPU there is less complexity on-chip, and so the design can be smaller, and therefore faster.

With the Acorn chip running single-cycle instructions, and with a clock cycle of 8 MHz (eight million cycles per second), this means that it has a full clock execution rate of 8 mips (million instructions per second). Because of its longer instruction cycle



times, a chip like the Intel 80386 even when running at its top speed of 20 MHz can only process instructions at around 4 to 5 mips.

Also, as these complex chips are optimised at current speeds, so as their clock speed increases through manufacturing improvements their overall throughput (ie total usable system speed) will not increase as much as with a simpler chip such as the Acorn or Immos ones.

Rather than single-cycle instructions, most of the CISC (Complex Instruction Set Computer) CPUs – the opposite to RISC CPUs – have what is known as micro-code instructions. This is where a complex machine-language instruction has to be decoded into several smaller instructions in order to perform some long task, such as supporting complex addressing modes.

**“As the chips increased in size and complexity, so did the instructions they processed. The new Acorn RISC chip has around, 25,000 transistors”**

With Risc chips there is no need for this two-tier system of machine language instructions, and so instructions can be directly processed by hard-wired control logic, without micro-code.

One of the aims of RISC architecture is that the complex and difficult tasks are taken out of the hardware design of the chip, but put into software instead, and central to this idea is in the use of optimised compilers to use the full speed potential of RISC designs. With complex addressing modes that are used in current CISC chips, such as the Intel 80386, memory-mapping and keeping track of how to address such segment of memory is a very complex task, and this is shown in the delay in producing a multi-tasking operating system, such as Microsoft's new 'OS/2', for the 80286 and 80386 chips.

## Better emulation

One of the fascinating possibilities for RISC architecture computers in the coming years is the one of getting away from hardware-dependent operating systems, and towards 'virtual' machine interfaces. With current chips having so much hard-wired micro-code, it is very difficult for a low-level program (such as an operating system) to be run on a different CPU design.

This is why MSDOS only runs on the Intel 80x86 family of chips, as it is written almost entirely in assembly language. If an operating system level program is not written for a particular chip's performance-enhancing peculiarities, then there will be less problems in converting that program to run on another chip.

Acorn's Archimedes uses RISC technology, yet the price has been kept to around £1,000. The most immediate effect has been to the speed of its processing, and the graphics are pretty neat, too.



Compiler writers could convert their products more easily with less sophisticated register sets to work with, and so again this would lead to software getting to the consumer faster than before.

Updating a program that is hard-wired (ie, one that is written in micro-code onto a chip) is very difficult and expensive for a designer, but if it is taken out of hardware and put into software control, then updating it, correcting bugs, and the like becomes much easier.

## RISC for the average user

Whilst the average user will not be so concerned with the number of machine level instructions that his or her computer's

chip can process, the power that RISC architecture gives will be of great benefit to users in a couple of years time.

More and more RISC-based computers are coming to the market, the first major one being the little-known IBM RT PC (RT standing for Risc Technology), which was targeted at the CAD/CAM market, which, with a price of upwards of £3,000 wasn't a big seller.

Now that Acorn has released a £1,000 Risc machine, and other manufacturers produce their own machines, so many users will see the benefit of speed, power and flexibility that this new design architecture can bring.

See page 18 for our review of the Archimedes.

# EUREKA! THE ARCHIMEDES

Kenn Garroch tells why he thinks the Archimedes is the most amazing micro yet to be produced, in this in-depth review of Acorn's newest machine.

**W**ell, what can I say except that I am impressed. The Archimedes is the most amazing micro I have ever used as far as speed goes, and since I am a BBC micro user from olden times, it qualifies as a good machine on most other counts as well.

It is based around a Basic operating system very similar to the other Acorn machines. However, it is possible to QUIT from Basic into an operating system (Supervisor) called Arthur (?).

Arthur uses the \* (asterisk) commands as on the original BBC, so \* gives a directory, etc. These built-in commands fall into various categories: disc access which includes the ADFS and FileSwitch, MOS utilities such as loading modules, configuring the battery backed Ram which holds a set of system variables (including a clock/calendar) and other presets. Also available are the mouse, window manager, sprite utilities, and sound controls.

Further commands and utilities can be loaded in in module form, eg, sprite definitions, sound waveforms, other languages, a Basic editor, fonts, etc. It is basically the same idea as the sideways Rom/Ram idea on the old BBCs, only greatly extended.

Switching the machine on with the Welcome disc in jumps the machine into Basic which promptly jumps and loads a series of modules (sprites, fonts, sounds, etc). The Wimp (Windows, Icons, Menus, Pointer) desktop is then run. This is a Basic program that provides a full mouse driven desktop environment along with accessories such as a diary, calculator and notepad.

One would think that being written in Basic, this is going to be slow. Not a bit of it, however, it is faster than either the Mac or the ST and provides more windows and in colour.

The Basic on the Archimedes is the fastest I have ever seen. Writing games

(simple ones such as *Meteors* or possibly *Elite*?) is quite straightforward, none of this messing around in machine code. However, if you want to get your hands dirty, as with all BBC Basics, there is an assembler built in, an ARM (Acorn RISC Machine) assembler at that.

I was unable to test this to any great extent since the ARM instruction set is a little strange. However, with the help of a good book, it should not prove too difficult to learn since the Archimedes is uncrashable (there and always break and reset to get out of the stickiest situations) and the results should be, to say the least, stunning, so it's well worth the effort.

There were three Basics available on the review machine, Rom Basic V, Ram Basic V, and 65Arthur which is a 6502 emulator running a 6502 version of Basic along with its built in 6502 assembler. This appears to be completely compatible with the old BBC B. I'm not sure how it compares with the Master but I presume it is compatible with that as well. The Ram Basic is identical to the Rom Basic apart from the fact that it has a full help utility for Basic commands, ie, HELP, lists all of the commands, HELP LIST reveals all about the LIST command, etc.

BBC Basic V contains a large number of commands including support for the mouse, the structures IF, THEN, ELSE, ENDIF, WHILE, ENDWHILE, REPEAT, UNTIL, CASE, WHEN, OTHERWISE, ENDCASE and the usual BBC Basic procedures and functions. It appears to be fully upward compatible with earlier versions but with a plethora of new commands.

The graphics commands are exceptional because of their speed, the filled rectangles, triangles, and circles being astonishingly fast. Number crunching is also pretty nifty, although I won't give any benchmarks as I think they give a false impression.

A better idea is gained by using the

machine and comparing its feel with others (not very scientific, I know). In this light, it is probably the fastest machine I've ever used (including minis and mainframes).

The Archimedes is capable of displaying 256 colours on a 640x256 pixel screen without any noticeable loss of speed on the graphics. The colours in these modes are chosen in a rather odd way since it is only possible to select between 64 and then give each a tint on a scale of 0-3.

In 256 colour modes (16, 4 or 2) palette colours are selected from a total of 4096 with the colour command, giving a pretty wide range. The 256 colour modes make it a little difficult to obtain the correct colour but after a little experimentation, it can be done.

In line with the compatibility idea, modes 0 to 7 are the same as those on the other BBC machines (mode 7 is teletext but not using the standard chip) with another 10 to available on a standard monitor plus three more super high res modes (640x512) using a multi sync monitor (of the ST).

One of the built-in modules runs the sprites. There are a number of commands for accessing these and the Welcome disc comes with a sprite editor. In use, the sprites are pretty fast, and five or six big ones can be on screen before any slowing down occurs. The shadow screen comes in handy as does the WAIT command which waits for the next vertical sync before continuing (the same as \*FX19 on BBC B etc). Good, fast, non-flickering graphics can easily be obtained in Basic without any great effort from a programming point of view.

The sound on the Archimedes is produced by a synthesis method using sampling. Each sound is stored as a waveform which can then be reproduced at any desired frequency. This gives the machine the ability to theoretically produce any sound, including speech. However, there



were no details on how this is done given in the manual.

When using all eight channels, the speed of the machine is reduced since there is so much processing going on, this is not too bad and using a couple of channels doesn't do any harm at all. The sound is produced in stereo, although the machine itself appears to have only a mono speaker. There is a 3.5mm stereo jack socket at the back which will take the standard 'Walkman' type headphones to give reasonable reproduction. I should think that the output impedance of this socket will match the input of most modern hi-fi amplifiers.

The manual supplied with the review machine was, putting it mildly, none too good, and only experience with other Acorn machines helped me find my way about. I do however, like to be able to get at all of the fiddly bits. The trouble is that there is so much stuff available on the machine, it would take a manual twice the size to cover it all in detail. Having said that, it gives a reasonable introduction but it could have been better. I hope that an improved version will be released soon.

As far as interfaces go, the Archimedes has the usual Centronics, RS232 (typical non-standard socket), RGB and composite video connectors (the latter is mono-chrome), and Econet. In addition there is room for some 'modules' - peripheral modules, another name for add-ons.

So far, all I have said is to the good of the

Archimedes, however, there are a few naff bits about the machine as well; nothing is perfect.

The keyboard is terrible, and it needs to be bashed quite hard to get some of the keys to react. It could be that since it was a review machine, it had been through the wars, this, however, is not really any excuse. There is a cooling fan which I found gave out quite an annoying buzz - good design of the case should obviate the need for one.

On the whole, the operating system lacks cohesion. Although it has a desktop program, and very nice it is too, there is a kind of half hearted feel to software. It is neither a Wimp machine, nor a standard keyboard Basic machine, it splits itself between both these worlds.

Unlike the Mac or the ST, the user interface is not very complete, and since the price is quite high, I would have expected a lot more especially with all that processing power. Acorn really should bundle more software with it, a good word processor and a decent paint package (the one it comes with is not really up to much considering the capabilities of the machine) would be nice, and it would encourage the business aspect as well.

Above all, the thing that really shows what the Archimedes is capable of is the bundled game - *Lander*. This has a superb solid 3D moving landscape, and the effects of the jets and explosions, etc, are fantastic.

If Acorn were to drop the price to match the ST, Atari would get really worried (Commodore should already have started thinking). As it is, knowing Acorn's past performance, I will be surprised if the Archimedes does anywhere near as well as it deserves.

Overall, the only conclusion I can reach is: As soon as I can afford it, I will buy one (the computer nutter in me can't wait), having had a model A BBC micro as my first machine and then upgraded to STs and Macintoshes, the Archimedes is a dream come true.

### The Archimedes range

- A305** 640K 3½ inch, drive 512K Ram, mouse, keyboard, and software: £918.85
- A305** 640K 3½ inch, drive 1Mb Ram, mouse, keyboard, and software: £918.85
- A410** 640K 3½ inch, drive 1Mb Ram, four module sockets, co-processor bus, hard disc controller, and software: £1,608.85
- A440** 640K 3½ inch, drive 4Mb Ram, four module sockets, co-processor bus, 20M hard disc, and software: £2,643.85

Mono monitor £57.50  
Colour monitor £230.00  
All prices include VAT.

# The Best Software Shop in Town

**ULTIMA**

WHITE LION WALK GUILDFORD SURREY  
TELEPHONE 0483-506939  
31 HANOVER BUILDINGS SOUTHAMPTON  
TELEPHONE 0703-39419  
OPPOSITE MACDONALDS

### MORE DISCOUNT

Mark Downs  
Promotions  
Special Deals

### MORE SERVICE

Free Tape Head  
Alignment service  
Demonstrations  
Club Membership  
Order by Phone

### MORE CHOICE

Over 500 Titles  
in stock  
Large selection of  
Discs  
Amstrad  
6128\*PCW\*PC  
Atari ST\*XE  
Spectrum  
Commodore  
Amiga\*Cl6\*C64  
BBC\*Electron  
MSX  
Full range of  
Joysticks\*Cables



We've squeezed our prices (but not our service)

**SQUEEZED**

ALL PRICES VAT & DELIVERY INCLUSIVE



520 STFM NEW LOW PRICE

Only **£279.00**  
*In stock now!*

520STFM with 1MEG memory upgrade installed £338.00  
1040 STF £479.00 SM125 M.monitor £119.00  
MEGA ST 2 £949.00 MEGA ST 4 £1249.00

All ST prices include: mouse etc. PLUS 5 disks full of s'ware including demos, utility, wordpro & game

Philips CM8833 Hi-res colour monitor w/ST cable £279.00  
(ONLY £269.00 if bought with an ST)

1MEG MEMORY UPGRADE (STFM ONLY) £59.00  
(Requires soldering, free fitting if you buy a new ST from us)

**3.5"** disks  
10..... £11.95 in 10 cap plastic case £13.95  
25..... £27.95 in 40 cap plastic case £34.95  
Fully guaranteed double sided media.

**Commodore**

64C computer only £149.95 Connoisseurs pack £199.95  
C128 computer only £199.95 C128 starter pack £239.95  
1541C d. drive £189.95 Music exp. pack £75.00  
Excelsior+ CBM compatible disk drive £159.95  
Excelsior+ as above c/w Freeze Machine cart. £179.95

**SCOOP purchase** Complete brand new '64 circuit boards. Use for repair, spare or upgrade a VIC-20. Limited qty. **only £45.00**

**AMIGA** A great offer on the fabulous new 500 model. Includes TV modulator, Deluxe Paint, Amiga Video or Textcraft & 5 disks of public domain s'ware. Price include voucher allowance. **only £469.00**

Philips CM8833 Hi-res colour monitor, STEREO sound, hi cable £279.00  
(ONLY £269.00 if bought with an AMIGA)

**AMSTRAD 1512/1640**  
ALL PRICES VAT & DELIVERY INCLUSIVE

**1640 IN STOCK NOW!**  
1640ECD single floppy £889.00 STANDARD  
1640ECD twin floppy £989.00 AMSTRAD  
1640ECD HD 20MEG £1299.00 MODELS  
1640ECD HD 32MEG (1 floppy) £1229.00 EVERHAM  
1640ECD HD 32MEG (2 floppy) £1329.00 32 & 4 MEG  
1640ECD HD 42MEG (1 floppy) £1379.00 MODELS

FULL 1512 RANGE INCLUDING THE HIGHLY POPULAR  
**EVESHAM 32/42 MEG 640K SPECIALS**

MONO		COLOUR	
SD-MM £479.00	STANDARD	SD-CM £649.00	
DD-MM £579.00	AMSTRAD	DD-CM £759.00	
HD20MEG £949.00	MODELS	HD 20MEG £1019.00	
SD 32MEG £829.00	EVESHAM	SD 32MEG £999.00	
DD 32MEG £949.00	32 & 42 MEG	DD 32MEG £1119.00	
SD 42MEG £1029.00	MODELS	SD 42MEG £1169.00	

All 32 & 42 MEG models are upgraded to 640k (£20.00 extra on standard models). We use top quality MINISCRIBE hard disk units in our conversions (as used by you know who).

**AMSTRAD OFFICE**...Consists of PC1512 DD/MM, DMP3160 Printer, Wordstar & Supercalc...OUR PRICE ONLY...£729.00

**EVESHAM OFFICE**...As above but upgraded to 640K and fitted with 32MEG hard card...A USEFUL BUNDLE...£1089.00  
**32MEG HARD CARD**...The easy way to upgrade to hard disk, just plugs in. Supplied ready configured...ONLY...£329.00

**PRINTERS** PRICES INCLUDE VAT, DELIVERY & CABLE

We use and recommend Star printers, they offer the best combination of features, print quality, reliability and value for money. Sheet feeders in stock.

Star NL100 New low price (state cartridge type) £219.00

+SPECIAL: 2 spare ribbons value £12.90 FREE with NL100

Star NX-15 Wide carriage version of NL100 £319.00

Star NB24-10 Brilliant 24 pin printer 216cps 72cps NLQ £479.00

Star NB24-15 Wide carriage 24 pin £599.00

PANASONIC KXP-1081 Best sub £200.00 model £179.00

Many other models in stock at competitive prices

All prices include VAT/delivery. Next day delivery £5.00 extra.

**How to order**

Send cheque, P.O. or ACCESS/VISA details by phone with ACCESS/VISA details  
Work, Educational or PLC orders accepted  
Same day despatch whenever possible  
Callers welcome, open 6 days 9.30-5.30  
All goods subject to availability E.&O.E.  
TELEX: 333284 EMICRO  
Also at: 1755 Perseus Rd., Catteridge, Birmingham B38 2DH Tel: 021 458 4564

**Evesham Micros**  
63 BRIDGE STREET  
EVESHAM  
WORCS WR11 4SF  
Tel: 0386 765500



**Once Bytten**

59 SWANLEY ROAD  
WELLING, KENT DA16 1LL  
Tel: 01-304 2631

(Callers by appointment only)  
Cheques and P.O.s to AMTEN LIMITED please

**FACTORY FRESH FLOPPIES —  
AT GIVEAWAY PRICE**

Yes, we've reduced our Disk prices even further!!  
And it's all your fault!! The more you buy the cheaper they get  
**ALL WITH LIFETIME WARRANTY**

With labels and hub ringed (5 1/4 in with sleeves)

	10 boxed in library case	25	50	100	200
5 1/4 in 5DD 96dpi	£5.95	£10.95	£18.95	£33.50	£65.00
5 1/4 in 5DD 500pi	£6.95	£12.50	£19.95	£35.50	£69.95
5 1/4 in 5DD 1050pi	£13.50	£23.50	£37.50	£71.50	£139.50
5 1/4 in 5DD 1250pi	£14.95	£23.95	£37.95	£71.95	£139.50

**IMPORTANT ANNOUNCEMENT**

We are delighted to announce that we have been appointed sole UK distributor of all GEOS products, by the importers First Analytical Ltd.

We are sure you are already familiar with the features of the GEOS systems (if not check the reviews in CCI). So good it even rated a multiple page review in Personal Computer World, not many 64 programs can boast that. But to encourage those of you who have not yet brought your 64 into a new lease of life look at these introductory prices to tempt you...

GEOS v1.3	£39.95	SPECIAL OFFER
Font Pack 1	£21.50	GEOS COMPATIBLE
Desk Pack 1	£23.50	CENTRONICS PRINTER
Writers Workshop	£32.95	CALBE. ONLY...
Geo File	£32.95	
Geo Calc	£32.95	
UK Font Disc (Lots of new fonts with a sign!)	£12.95	

**PLEASE NOTE:** All our prices (Disks and software) include VAT and carriage in UK. Export orders welcome, please add 10% to above prices.

**WANTED**

We want to buy your computer, your printer, your disk drive, your modem, your monitor, your software, your servicing stocker. FOR CASH!  
WE WILL GIVE EVEN MORE IN PART EXCHANGE. Against the latest micros from AMSTRAD, ATARI, COMMODORE et al.

FOR A QUICK QUOTE (or a slow lingering one) ring:

**KEITH McGOVERN on 01-407 8447 Mon-Fri 9am-6pm  
or 01-304 2631 Sat-Sat 9am-10pm**

**ORDER LINE 9am to 10pm**



**SYSTEMS ARCHITECTS**

COMMERCIAL AND COMPUTER SERVICES LIMITED 01 549 3028

Amiga 1000	28.00	Leadertech	20.00	Carte	14.00
Bureaucracy	28.00	Leadertech	20.00	Golden Pond	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Hacker	28.00	Leadertech	20.00	Plots	14.00
Home	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00
7 Cards of Gold	28.00	Leadertech	20.00	Plots	14.00
Adventure Course Set	28.00	Leadertech	20.00	Plots	14.00
Amiga 500	28.00	Leadertech	20.00	Plots	14.00
Master Madness	28.00	Leadertech	20.00	Plots	14.00
Cliff	28.00	Leadertech	20.00	Plots	14.00
Shanghai	28.00	Leadertech	20.00	Plots	14.00
Less Games	28.00	Leadertech	20.00	Plots	14.00</

# THE WAY THAT LISP GOES TOGETHER

Kenn Garroch continues his series on programming in Lisp: this week he finishes his analysis of recursion and takes a deeper look at the inside workings of the language.

Following on from last week's article, here is the conclusion of our look at recursion.

For example, the following function gives powers using recursion.

```
(def power (n m)
  (cond ((zerop m) 1)
        (t (times n (power (difference m 1))))))
```

It is used as  $n$  to the power of  $m$  ( $n^m$ ) and works by subtracting 1 from  $m$  using *difference*, and setting this as the new argument for *power*. *Times* multiplies  $n$  by the result of *power*. First of all, the function winds itself up until  $m$  is zero [*zerop* gives true when its argument is zero] and gives 1 as the result. This is then multiplied by  $n$  to give  $n$  which is returned as the result of *power* this time. Since the top level has not yet been reached, *power* returns  $n$  to *times* to give  $n \times n$  and next time to give  $n \times n \times n$ . The number of times *power* returns  $n$  depends on how many times the function recursed. Note that it also gives the correct results for  $n^2$  and  $n^1$  but not for  $n^0$  or  $m$  being any negative number. In this case, since *zerop* never gets  $m$  to be zero the function just keeps on recurring until the memory is full.

As you can see, recursion can sometimes be difficult to follow even with the simple examples given here. A bit of thought, and a little practice makes it a little clearer, and since it is such a slick programming method, and the mainstay of Lisp, it is worth the effort.

Another example is *factorial* which is almost identical to *power*:

```
(def fact (x)
  (cond ((zerop x) 1)
        (t (times x (fact (difference x 1))))))
(fact 5)
```

gives 120, i.e.  $5 \times 4 \times 3 \times 2 \times 1$ .

Now having looked at recursion, and defining functions, the next step is to have a look a little deeper inside the language, and see how things are put together.

Lisp is made up of lists of data, and internally, these lists are set up as cells, each being linked in such a way as to give a list. Take the list:

(setq letter 'a) which gives the list (a)

This is a list containing one item and the letter is a pointer to its start. Internally, the list is a series of pointers arranged in the same way as the list (see examples). From a programming point of view, this is all transparent, however, there are a few points worth noticing. When taking the car (first in the list), the computer simply looks at the name of the list, and can immediately see the first entry. The cdr is then the rest. Getting at entries in between is a little more difficult. Although there are the commands *cadr* and *caddr* (take the car of the cdr and car of the cdr of the cdr), for long lists other methods have to be used. The two functions *eq* and *equal* work in different ways. *Eq* actually compares list pointers so, for two lists to be *eq* then they must be versions of the same list. For example:

```
(setq 1st1 '(a b c))
(setq 1st2 '(a b c))
(eq 1st1 1st2)
```

gives nil or not true.

This is because, although the lists have the same contents, they are not in the same places in memory i.e. there are two lists 1st1 and 1st2. However, continuing the example:

```
(equal 1st1 1st2) gives true since the contents of each list are the same.
(setq 1st3 1st1)
(eq 1st3 1st1) gives true since 1st3 is a copy of 1st1 and therefore points to the same physical list.
```

The command *cons* can be used to add things to the front of the list, for example:

```
(cons 'head 1st1) gives the list
(head a b c)
```

Note that it does not actually add it to the list in memory, it simply produces the result of adding it to the list. To actually add to the list, (setq 1st1 (cons head 1st1)) must be used.

One of the clever things about Lisp is that defined functions are themselves lists, and as such can be accessed with all of the usual commands. The difference between a function and an ordinary list is the Lambda

identifier. Try creating the following function: (def test (arg) (print arg) (print arg)). Now simply type in test without the brackets. You should get: (lambda (arg) (print arg) (print arg)).

This is a list with *lambda* at its head, *arg* (or list of args) in second place, and the rest of the function following as a series of lists. It follows that a function can be defined by attaching a *lambda* to the start of the list at the head of which are the arguments for the function. For example, (setq test '(lambda (arg) (print arg))) defines test as a function to be used as (test 'a) for example to print the letter a.

The function fun can be defined as: (def fun (nme 1st) (set nme (cons 'lambda 1st))). Fun now performs exactly the same function as *def* or *defun* i.e. it defines functions. It has to be used in a slightly different way: (fun 'test '(((arg) (print arg) (print arg)))).

This is not really of much use since *def* already exists for just this purpose. However, it can be modified to check whether the definition already exists, tell the user if it does, and not do the definition. For this, the function *find* needs to be defined as: (def find (func 1st) (cond ((null 1st) nil) ((equal func (car 1st)) t) (t (find func (cdr 1st)))).

This is a recursive function that works its way down a list until it either finds a name that matches *func*, or gets to the end of the list. In the first case, it returns t (true a match was found) and in the second, nil (false the end of the list was reached and a match not found). Try it out with (find 'a '(b c a d)) and (find 'a '(d c b s)).

The function fun can now be redefined using *find* to look in the oblist to see if the function exists. The oblist is a Lisp's record of all functions and objects that have been defined, try typing in (oblist) to see what is there. The new definition for fun is: (def fun (nme 1st) (cond ((find nme (bolist)) (print 'Exists)) (t (set nme (cons 'lambda 1st)))).

Now try: (fun 'test '(((arg) (print arg) (print arg)))) and you should see it in action.

Kenn Garroch continues this series next week.

## Discmon

A Moulden

The last part of Discmon this week, and also the last of the instructions. Discmon recognises 22 commands, some of which take parameters.

Commands with a T after them must have the parameter entered in decimal.  
DRV x selects drive number x (0-3).  
TRK x (T) moves to selected track.  
SCT x moves to sector x (0-9).  
ABS x (T) moves to absolute sector.  
REL +/- x (T) moves relative to current sector.  
FILE x moves to beginning of file x.

DH x converts decimal x to hex.  
HD x converts hex x to decimal.  
ASC x resets byte changed with F2 key.  
CHR x resets F2 byte but select x rather than Ascii.  
NEW restarts the program.  
SAVE saves a sector to disc.  
HELP displays brief instructions.  
QUIT exits Discmon.

```
3970LDA#9:JSR#FFE3:JSR#FFE3
3980JSR#FFE3:JSR#FFE3:JSR#FFE3:JSR#FFE3
:TXA:AND#47:BNCEouterloop:RTS
3990JSR#FFE3:JSR#FFE3:TXA:AND#47F
4000.printspace LDA#32:JMPback
4010.printhex PHA:CLC:AND#F0:ROR:A:ROR
:ROR:A:ROR:JSR#nyb:PLA:AND#F
4020.nyb CLC:ADC#48:CMF#58:BCC numbers:A
DC#6
4030.number JMP#FFE3
4040.star LDX#5:LDA#31:JSR#FFE3:LDA#37:
JSR#FFE3:LDA#5:JSR#FFE3
4050.starloop LDA#32:JSR#FFE3:LDA#10:JS
R#FFE3:LDA#8:JSR#FFE3:INX:CPX#21:BNCEstar
loop:RTS
4060.bin STAB#F:LDA#31:JSR#FFE3:LDA#29:
JSR#FFE3:LDA#2:JSR#FFE3
4070LDY#7:binloop
4080LDA#6:BF
4090LDX#0
4100.binner:STY#BE
4110ROR:A:INX:CPX#8:BNCE binner
4120DEY:AND#1:CLC:ADC#48:JSR#FFE3
4130CPY#0:BNCE binloop:LDA#6:AND#1:CLC:
ADC#48:JSR#FFE3:RTS
4140JNEXT:ENDPROC
4150:
4160DEFFPROCwipe:VDU26
4170PRINTAB (EX+3+3,FZ+5):c$
4180PRINTAB (EX+3+6,FZ+5):c$
4190ENDPROC
4200:
4210IFERR=2060TO70
4220#FX4
4230IFERR=17VDU26,0,23,39,22,12:1FFNup
ateyn:PROCsave:GOTO5020:ELSEIFERR=1760TO
5020
4240REPORT:PRINT;" at "ERL:END
4250:
4260DEFFPROCchange (NX,OX)
4270memZ?oX#XZ
4280NS=STR#NZ:IFLEN#NS=1NS="0"+NS
4290PRINTTAB (EX+3+4,FZ+5):
4300PRINTLEFT$ (NS,1)RIGHT$ (NS,1)
4310PRINTTAB (EX+29,FZ+5):
4320IFNL>31ANDNL<127VDUNDELSEPRINT " ";
4330IFNZ=47F ODX#FF ENDPROC
4340PROCwipe:EX=EX+1:OZ=OZ+1
4350IFEX=8:EX=0:FZ=FZ+1
4360ENDPROC
4370:
4380DEFFNvalidhex (Q$,LX):LOCAL
```

```
4390FLX=-1:FORPZ=1TOLX
4400G#MID$(Q$,PZ,1)
4410GT=ASC#B
4420IF (GX)57ANDGX<65)OR (GX)48ORGX)70)FL
X=0
4430NEXT:=FLX
4440:
4450DEFFPROCinst:VDU26,0,20,39,3,12
4460PRINT"r$Keys are..."
4470PRINT$CURSOR KEYS"m$ move cursor
"4480PRINT$SHIFT + CURSOR KEYS"m$ mov
e cursor to extremes of motion"
4490PRINT$CTRL + CURSOR KEYS"m$ move
around disc"
4500PRINT$CTRL + SHIFT + CURSOR KEYS"
m$ move around disc in steps of
five"
4510PRINT$TAB"m$ toggle between firs
t and second half of sector"
4520PRINT$COPY or CTRL_"m$ display
instructions"
4530PRINT$FUNCTION KEY f0"m$ display
disc info"
4540PRINT$FUNCTION KEY f1"m$ change
case"
4550PRINT$FUNCTION KEY f2"m$ insert
set character"
4560PRINT$ESCAPE"m$ leave Discmon"
4570PRINT"CHR#133"Press COPY...";REPE
TUNTILGET=135:CLS
4580PRINT"r$Language..."
4590PRINT$DRV drvno"m$ select drive
number"
4600PRINT$SCT scno"m$ move to secto
r specified"
4610PRINT$TRK trkno (T)"m$ move to t
rack trkno"
4620PRINT$ABS absol (T)"m$ move to a
bsolute"SPC9"sector specified"
4630PRINT$REL (+)/- offset (T)"m$
move sector relative to current posi
tion"
4640PRINT$FILE fsp"m$ move to file s
pecified"
4650PRINT$DH/HD number"m$ hex/dec /
dec/hex"
4660PRINT$ASC hexno"m$ set ascii for
f2"
4670PRINT$CHR chr"m$ set character f
or f2"
4680PRINT$NEW"m$ new disc"
4690PRINT"m$Press COPY..."
```

```
4700REPEATUNTILGET=135:CLS
4710PRINT"r$Language (...cont'd)..."
4720PRINT$Single chr string"m$ Inser
t character"
4730PRINT$Double chr string"m$ Inser
t ascii code"
4740PRINT$"+/- hexno"m$ Cbyte=Cbyte +
/- hexno"
4750PRINT$OR byte"m$ Cbyte = Cbyte O
R byte"
4760PRINT$AND byte"m$ Cbyte = Cbyte
AND byte"
4770PRINT$XOR byte"m$ Cbyte = Cbyte
XOR byte"
4780PRINT$NOR byte"m$ Cbyte = NOT (C
byte OR byte)"
4790PRINT$NAND byte"m$ Cbyte = NOT (
Cbyte AND byte)"
4800PRINT$XNOR byte"m$ Cbyte = NOT (
Cbyte XOR byte)"
4810PRINT$NOT"m$ Cbyte = NOT Cbyte"
4820PRINT$NEB"m$ Cbyte = NEB Cbyte"
4830PRINT$SAVE"m$ save sector to dis
c"
4840PRINT$HELP"m$ display brief inst
ructions"
4850PRINT$QUIT"m$ leave program"
4860PRINT"CHR#133"Press COPY...";REPE
TUNTILGET=135:CLS:ENDPROC
4870:
4880DEFFNupdateyn:IFedit=0:=FALSE
4890VDU26,0,23,39,22,12
4900PRINT:y$Update disc? (y/n);
4910GET
4920IF=78OR=110CLS:C=0:S$="":=FALSE
4930IFC>89ANDC<121GOTO4910
4940CLS:C=0:S$="":=TRUE
4950:
4960DEFFNupper (Z$)
4970Y$=""=FORPZ=1TOLENZ$
4980AZ=ASC#ID$(Z$,PZ,1)
4990IFAZ>96ANDAZ<123Y$=Y$+CHR$(AZ-32)EL
SEY$=Y$+CHR#AZ
5000NEXT:=Y$
5010:
5020CALL(1#FFFF AND#FFFF)
5030:
5040DEFFPROCwipe (NX):A=6:#FX15
5050IFNupdateyn:=TRUE:PROCsave
5060B=A:IFB=136PROC:PROCloadsave (DRX,T
RX,SCX,1):PROCshow
5070IFB=137PROC:PROCloadsave (DRX,TRX,S
```

# PROGRAMMING: BBC

```

CX,1):PROCshow
5080IFB=139ANDNZ=5:PROCfiveon:ENDPROC
5090IFB=139ANDNZ=5:PROCfiveback:ENDPROC
5100IFB=139ANDTRX=TRX-1 TRX=0:PROCload
save (DRZ, TRZ, SCZ, 1):PROCshow:ENDPROC
5110IFB=139ANDTRX=0:TRX=TRX+1:PR
OCloadsave (DRZ, TRZ, SCZ, 1):PROCshow
5120IFB=139ANDTRX=0:TRX=TRX-1:PROCload
save (DRZ, TRZ, SCZ, 1):PROCshow:ENDPROC
5130IFB=139ANDTRX=0:TRX=TRX-1:PROCload
save (DRZ, TRZ, SCZ, 1):PROCshow
5140ENDPROC
5150:
5160DEFFPROC
5170SCZ=SCZ-NZ:IFSCZ<0ANDTRX=0:SCZ=SCZ
+10:TRZ=TRZ-1
5180IFSCZ<0ANDTRX=0:SCZ=SCZ+10:TRX=TRX
-1
5190ENDPROC
5200:
5210DEFFPROC
5220SCZ=SCZ+NZ:IFSCZ>9ANDTRX=0:TRX=1:SC
Z=SCZ-10:TRZ=TRZ+1
5230IFSCZ>9ANDTRX=TRX-1:SCZ=SCZ-10:TRZ
=0
5240ENDPROC

```

```

5250:
5260DEFFPROCinfo:VDU28,0,20,39,3,12
5270PRINT "r#"Program Start sector"TA
B(27,1)*End sector"
5280PRINTTAB(12,2)*r#" (absolute)*TAB(27,
2)* (absolute)"
5290VDU28,0,20,39,5,12,14
5300FORPZ=1TONUMZ
5310PRINTTAB(10)g$ne$(PZ)
5320PRINTTAB(11)c$D:"FNPAD(STR$(stZ(PZ
)))
5330PRINT "H:"FNPAD(STR$(stZ(PZ)))
5340PRINTTAB(26)D:"FNPAD(STR$(enZ(PZ))
)
5350PRINT "H:"FNPAD(STR$(enZ(PZ)))
5360NEXT
5370PRINT "M#Press SPACE..."
5380REPEATUNTILGET=32:VDU12,15
5390ENDPROC
5400:
5410DEFFNnew (ZX,VZ)
5420W$="":FORNZ=ZXTOTZ+VZ-1
5430IX=ZX:IFIX>31ANDIX<127ANDIX(129W$
W$+CHR$(IXELSEW$W$+"E"
5440NEXT:W$
5450:

```

```

5460DEFFNPAD (V$):IFLENV$=1V$="00"+V$
5470IFLENV$=2V$="0"+V$
5480=V$
5490:
5500DEFFNFj1e:ABZ=TRZ+10+SCZ
5510F$=0:CX=0:REPEAT:CX=CX+1
5520IFABZ=stZ(CZ)ANDABZ=enZ(CZ)F$=CX
5530UNTILF$<0ORCX=NUMZ+1
5540IFCX=NUMZ+1="None"
5550=ne$(CX)
5560:
5570DEFFPROCcase:BZ=0Z?enZ
5580IFBZ=64ANDBZ(91BZ=BZ+32:GOTO5600
5590IFBZ=96ANDBZ(123BZ=BZ-32
5600PROCchange (BZ, CZ):edit=i=1
5610ENDPROC
5620:
5630DEFFPROCfiveon
5640TRZ=TRZ+5:IFTRZ=TRX-1TRZ=TRX-TRX
5650PROCloadsave (DRZ, TRZ, SCZ, 1)
5660PROCshow:ENDPROC
5670:
5680DEFFPROCfiveback
5690TRZ=TRZ-5:IFTRZ<0TRZ=TRZ+TRX
5700PROCloadsave (DRZ, TRZ, SCZ, 1)
5710PROCshow:ENDPROC

```

## PROGRAMMING: SPECTRUM

### Logo-R

Robert Glavas

**T**his program is a Spectrum version of the language LOGO. It involves the use of a turtle and pen to draw pictures or patterns on the screen. The basic LOGO instruction set is used here, and includes, UP, PEN, DOWN, PEN, LEFT, RIGHT, FORWARD and BACK.

There are two modes of operation, the direct mode and the programming mode. In direct mode any instruction entered will be executed immediately. In the programming mode every instruction will be stored until you revert back to direct mode, where you can run the listing.

The instructions are as follows.

UP PEN stops the drawing although the turtle will still move.

DOWN PEN starts drawing.

CENTRE positions the turtle in the centre of the screen.

FORWARD N moves the turtle forwards N units.

BACK N moves the turtle back N units.

LEFT N rotates the turtle anti-clockwise N units.

RIGHT N rotates the turtle clockwise N units.

NORTH makes the turtle look towards the top of the screen.

CLS clears the screen.

COPY produces a hardcopy of the screen.

FRESH does a CLS, CENTRE, NORTH, UP PEN.

V(N)=X is how you can store variables and do calculations. You can incorporate variables in other commands, such as

FORWARD V(3)\*V(2)+7.

NEW deletes a program.

SAVE and LOAD are obvious.

HELP renders assistance.

VALUES displays all the variables.

EXIT returns to Basic.

REPEAT N... AGAIN is a loop structure which repeats the lines between the REPEAT and AGAIN, N times.

There are two commands which can only be used in direct mode, and they are RUN, which executes your program, and PROG which enters programming mode.

The following commands can only be used in programming mode.

LIST lists the current program.

LLIST produces a hardcopy.

DEL deletes the last line entered.

PUL lets you insert a line into the program.

EDIT lets you edit a line.

END switches you to direct mode.

```

1 GO TO 900
5 INPUT **: PRINT #0:"ERROR": BEEP .1
,30.7: PAUSE 50: LET EXR=TRUE: RETURN
10 DATA "UP PEN": LET PEN=UP: RETURN
20 DATA "DOWN PEN": LET PEN=DOWN: RETU
RN
30 DATA "CENTRE": LET X=128: LET Y=88:
RETURN
40 DATA "FORWARD": LET D=VAL J$(9 TO )

```

```

: LET A=P/(180/(ANG+.00001)): LET DX=(C
OS A)*D: LET DY=(SIN A)*D: IF PEN=DOWN T
HEN GO SUB 150
41 LET X=X+DX: LET Y=Y+DY: RETURN
50 DATA "BACK": LET D=VAL J$(6 TO ): L
ET A=P/(180/(ANG+.00001)): LET DX=(COS
A)*D: LET DY=(SIN A)*D: IF PEN=DOWN TH
EN GO SUB 150
51 LET X=X+DX: LET Y=Y+DY: RETURN

```

```

60 DATA "LEFT": LET D=VAL J$(6 TO ): L
ET ANG=ANG+D: RETURN
70 DATA "RIGHT": LET D=VAL J$(7 TO ):
LET ANG=ANG-D: RETURN
80 DATA "NORTH": LET ANG=90: RETURN
90 DATA "CLS": CLS: RETURN
100 DATA "COPY": COPY: RETURN

```

continued on page 24 ►



# PROGRAMMING: SPECTRUM

◀ continued from page 23

```
110 DATA "V": LET N6="": FOR F=3 TO 1
5: IF J6(F)="" THEN LET N6=N6+J6(F):
NEXT F
```

```
112 IF N6="" OR N6(1)="" OR N6(LEN N
6)="" THEN GO SUB ERROR: RETURN
113 LET N=VAL N6: IF N>VARS OR N<1 THEN
GO SUB ERROR: RETURN
114 LET V(0)=VAL J6(F+1): RETURN
120 DATA "FRESH": LET X=128: LET Y=88:
LET ANG=90: LET PEN=UP: CLS: RETURN
130 DATA "REPEAT": RANDOMIZE VAL J6(8
TO 1): LET L6=L6+CHR$(PEEK 23670)+CHR$
(PEEK 23671): RANDOMIZE C: LET L6=L6+CHR
$(PEEK 23670)+CHR$(PEEK 23671): RETURN
```

```
140 DATA "AGAIN": IF L6="" THEN GO SUB
ERROR: RETURN
```

```
141 LET Z=CODE (L6(LEN L6-3))+256+CODE
(L6(LEN L6-2)): LET Z=Z-1: RANDOMIZE Z
: LET L6(LEN L6-3)=CHR$(PEEK 23670): LE
T L6(LEN L6-2)=CHR$(PEEK 23671): IF Z=0
THEN LET L6=L6+CHR$(PEEK 23670): RETURN
142 LET C=CODE (L6(LEN L6-1))+256+CODE
(L6(LEN L6)): RETURN
```

```
149 REM XXXX LINES XXXX
```

```
150 IF X=0 AND Y=255 AND Y=0 AND Y=
175 AND X+Y=0 AND X+Y<255 AND Y+Y=
0 AND Y+Y<175 THEN PLOT X,Y: DRAW DX,
DY: RETURN
```

```
155 IF X=0 AND Y=255 AND Y=0 AND Y=
175 THEN PLOT X,Y: DRAW DX,DY: RETURN
160 IF X+Y=0 AND X+Y<255 AND Y+Y=
0 AND Y+Y<175 THEN PLOT X+Y,Y: DR
AW -DX,-DY: RETURN
```

```
170 RETURN
```

```
200 REM XXXX ARROW XXXX
210 IF X<6 OR X>248 OR Y>169 OR Y<7 THE
N RETURN
```

```
220 LET Z=ANG-135: LET A=P/1/(180/(Z+.00
01)): PLOT X,Y: DRAW 7*(COS A),7*(SIN A)
: LET Z=Z-135: LET A=P/1/(180/(Z+.0001)):
DRAW 10*(COS A),10*(SIN A): LET Z=Z-135
: LET A=P/1/(180/(Z+.0001)): DRAW 6*(COS
A),6*(SIN A): RETURN
```

```
300 REM XXXX SAVE XXXX
```

```
310 IF P6="" THEN GO TO 1000
```

```
320 LET L=LEN P6/32: LET I(1)=LN: DIM
T$(LN,32): IF L>100 THEN INPUT **: PRI
NT #0:"SORTING. PLEASE WAIT."
```

```
330 FOR F=1 TO L: LET T$(F)=P6(((F-1)*
32)+1 TO )
```

```
340 NEXT F: INPUT **: SAVE "I" DATA T$
: POKE 23736,181: SAVE "I1" DATA T$(1): D
IM T$(1): GO TO 1000
```

```
400 REM XXXX LOAD XXXX
410 CLS: PRINT AT 5,0:" " " " "LOAD
INS"
```

```
420 LET L=LEN P6/32: LET I(1)=LN: DIM T
$(1,32): LOAD "I1" DATA T$(1)
```

```
430 LET P6="": IF T(1)>100 THEN INPUT
**: PRINT #0:"SORTING. PLEASE WAIT."
```

```
430 FOR F=1 TO T(1): LET P6=P6+T$(F): N
EXT F: CLS: GO TO 1000
899 REM XXXX VARS XXXX
```

```
900 LET P6="": LET ANG=90: LET X=128: L
ET Y=88: LET DOWN=1: LET UP=0: LET PEN=U
P: DIM T(1): LET ARROW=200: LET ERROR=5
```

```
910 LET STORE=60064: LET GET=60076: LET
FALSE=0: LET TRUE=1: LET SCROLL=3200: L
ET DIRECT=1: LET PROG=2: LET MODE=DIRECT
```

```
920 POKE 23658,8: POKE 23649,3: POKE 23
561,20: POKE 23562,2: POKE 23624,69: POK
E 23693,71: CLS: BEEP .0001,69
```

```
930 GO SUB 6000: PAUSE 50
940 GO SUB 5000
```

```
950 CLS: LET L=USR STORE
```

```
999 REM XXXX ENTRY XXXX
1000 LET L=USR 60000: LET EXR=FALSE: LET
A6="PROG": IF MODE=DIRECT THEN LET A6
="DIRECT": LET L=USR GET: GO SUB ARROW
```

```
1010 INPUT (A6): LINE J6: LET J6=J6+
: LET J6=J6
```

```
1020 IF J6(1)="" THEN GO TO 1010
1030 IF J6( TO 3)="NEW" THEN LET P6="":
GO TO 1000
```

```
1040 IF J6( TO 4)="SAVE" THEN GO TO 300
1050 IF J6( TO 4)="LOAD" THEN GO TO 400
1060 IF J6( TO 4)="HELP" THEN GO SUB 50
0: GO TO 1000
```

```
1070 IF J6( TO 6)="VALUES" THEN GO TO 4
500
```

```
1080 IF J6( TO 4)="EXIT" THEN STOP
1090 IF MODE=DIRECT THEN GO TO 2000
```

```
1099 REM XXXX PROG ENTRY XXXX
1100 IF J6( TO 3)="END" THEN LET MODE=D
IRECT: CLS: GO TO 1000
```

```
1110 IF J6( TO 5)="LIST" THEN (PRINT
INVERSE I:"START", INVERSE O:P6: INVERS
E I:"END",: GO TO 1000
```

```
1120 IF J6( TO 4)="LIST" THEN GO SUB 12
00: GO TO 1000
```

```
1130 IF J6( TO 4)="EDIT" THEN GO TO 300
0
```

```
1140 IF J6( TO 3)="PUT" THEN GO TO 3500
1145 IF J6( TO 3)="DEL" AND P6<>" THEN
LET P6=P6+LEN P6-32: INPUT **: PRI
NT AT 21,0:"DELETED": LET L=USR SCROLL:
GO TO 1000
```

```
1150 RESTORE: FOR Q=1 TO 14: READ A6: I
F A6=J6( TO LEN A6) THEN PRINT AT 21,0:
J6: LET L=USR SCROLL: LET P6=P6+J6: GO
TO 1000
```

```
1155 IF J6(3)="" AND A6( TO 2)=J6( TO 2
) THEN LET J6=A6+J6(3 TO ): LET J6=J6(
TO 32): PRINT AT 21,0:J6: LET L=USR SCOR
LL: LET P6=P6+J6: GO TO 1000
```

```
1160 NEXT Q: GO SUB ERROR: GO TO 1000
1200 CLS: POKE 23692,-1: PRINT AT 21,0:
INVERSE I:"START", INVERSE O:P6": RETU
RN
```

```
1999 REM XXXX DIRECT ENTRY XXXX
2000 IF J6( TO 4)="PROG" THEN LET MODE=
PROG: CLS: GO SUB 1200: GO TO 1000
```

```
2010 IF J6( TO 3)="RUN" THEN GO TO 4000
2020 RESTORE: FOR F=1 TO 120 STEP 10:
READ A6: IF A6=J6( TO LEN A6) THEN GO S
UB F: INPUT **: LET L=USR STORE: GO TO 1
000
```

```
2025 IF J6(3)="" AND A6( TO 2)=J6( TO 2
) THEN LET J6=A6+J6(3 TO ): GO SUB F: I
NPUT **: LET L=USR STORE: GO TO 1000
```

```
2030 NEXT F: GO SUB ERROR: GO TO 1000: R
EM : HELLO MUM !
```

```
2999 REM XXXX EDIT PROG XXXX
3000 IF P6="" THEN GO TO 1000
```

```
3010 CLS
3020 PRINT AT 21,0: INVERSE I:"START",:
LET L=USR SCROLL
```

```
3030 FOR F=1 TO LEN P6 STEP 32
3040 PRINT AT 0,23: INVERSE I:"I - ALTER
": AT 1,23:0 - DEL "
```

```
3050 PRINT AT 21,0: INVERSE I:P6: IF F+
31)
3060 FOR Z=4E10 TO 4E10: PAUSE 0: LET A
6=INKEY$
```

```
3070 PRINT AT 21,0:P6(F TO F+31)
3080 IF A6="I" THEN GO TO 3200
3090 IF A6="O" THEN LET A6="": GO TO 32
10
```

```
3100 LET L=USR SCROLL
3110 NEXT F: PRINT AT 21,0: INVERSE I:"E
ND",: LET L=USR SCROLL: GO TO 1000
```

```
3200 GO SUB 3300
3210 LET Q6=P6( TO F-1)
3220 LET W6=P6(F+32 TO )
```

```
3230 LET P6=Q6+A6+W6
3240 IF A6<>" THEN PRINT AT 21,0:A6: G
O TO 3100
```

```
3250 GO SUB 1200: GO TO 1000
3300 LET X6=P6(F TO F+31)
3310 LET A6="": FOR G=32 TO 1 STEP -1: I
F X6(G)="" THEN NEXT G
```

```
3320 LET A6=X6( TO 6)
3330 PRINT AT 21,0:A6:
3399 REM XXXX AMEND XXXX
```

```
3400 FOR Z=4E10 TO 4E10: PRINT FLASH I
:" ": PAUSE 0: LET I6=INKEY$: IF I6=""
THEN PRINT CHR$(8): NEXT Z
```

```
3410 PRINT CHR$(8): IF I6=CHR$(13) AND A6
="" THEN RETURN
```

```
3420 IF I6=CHR$(13) THEN LET A6=A6+
: LET A6=A6
( TO 32): RETURN
```

```
3430 IF I6=CHR$(12) AND A6<>" THEN LET
A6=A6( TO LEN A6-1): PRINT "": CHR$(8): CH
R$(8):
3440 IF I6=CHR$(12) THEN NEXT Z
```

```
3450 IF I6=LEN A6-31 THEN NEXT Z
3460 IF I6="" AND I6<="" THEN LET A6
=A6+I6: PRINT I6:
3470 NEXT Z
```



## PROGRAMMING: SPECTRUM

```

3499 REN XXXZ INSERT XXXZ
3500 IF A#="" THEN GO TO 1000
3510 CLS
3520 PRINT AT 21,0; INVERSE 1;"START";
LET L=USR SCROLL;USR SCROLL
3530 FOR F=1 TO LEN P# STEP 32
3540 PRINT AT 21,0;P#(F TO F+31)
3550 LET L=USR SCROLL; PRINT AT 19,0; F
ASH 1;" "
3560 FOR Z=-4E10 TO 4E10; PAUSE 0; LET
S=INKEY$
3570 IF A#=""A" AND A#(="Z" THEN PRINT
AT 19,0; GO TO 3700
3580 IF A#(=" " THEN NEXT Z
3590 PRINT AT 19,0; ; LET L=USR SCROLL
3600 NEXT F; PRINT AT 21,0; INVERSE 1;"E
ND"; ; LET L=USR SCROLL; GO TO 1000
3700 PRINT A#;
3710 FOR Z=-4E10 TO 4E10; PRINT FLASH ;
;" "; PAUSE 0; LET S=INKEY$; IF S=""
THEN PRINT CHR# B; NEXT Z
3720 PRINT CHR# B; IF I#=CHR# 13 THEN
GO TO 3800
3730 IF I#=CHR# 12 AND A#(="" THEN LET
A#=A#; TO LEN A#-1); PRINT " ";CHR# B;CH
R# B;
3740 IF I#=CHR# 12 THEN NEXT Z
3750 IF LEN A#=30 THEN NEXT Z
3760 IF I#="" THEN I#=" " AND I#(=" " THEN LET A#
=A#+I#; PRINT I#;
3770 NEXT Z
3800 IF A#="" THEN GO TO 3590
3810 LET A#=A#+
      " "; LET A#=A#( TO 32)
3820 LET Q#=(P# TO F-1)
3830 LET M#=(P#(F TO F-1)
3840 LET P#=(Q#(F+1)

```

```

3850 GO SUB 1200: GO TO 1000
3999 REM XXXX RUN PROG XXXX
4000 IF P$="" THEN GO TO 1000
4010 LET EXR=FALSE: LET L$="": FOR C=1
TO LEN P$ STEP 32
4020 IF INKEY$="" THEN INPUT "": LET L
=USR STORE: GO TO 1000
4030 LET J$=ASC(C*31)
4040 INPUT "": PRINT #0;J$
4050 RESTORE: FOR Q=10 TO 140 STEP 10:
R$=A$ IF A$=J$( TO LEN A$) THEN R$=
UB Q: IF EXR=TRUE THEN INPUT "": LET L
=USR STORE: GO TO 1000
4055 IF A$=J$( TO LEN A$) THEN NEXT C:
INPUT "": LET L=USR STORE: GO TO 1000
4060 NEXT Q: GO SUB ERROR: GO TO 1000
4499 REM XXXX VALUES XXXX
4500 CLS: FOR F=1 TO VARS: PRINT "V("F
)=":V(F): NEXT F
4510 INPUT "": PRINT #0:"PRESS ANY KEY T
O CONTINUE": PAUSE 0: CLS
4520 GO TO 1000
4999 REM XXXX HELP XXXX
5000 CLS
5010 LET Z$="
"CHR$ 13:CHR$ 13
5020 PRINT "LOGO INSTRUCTIONS"Z$
5030 RESTORE: FOR F=1 TO 14: READ A$: P
RINT A$: NEXT F
5035 PRINT "SHORTHAND:""FIRST TWO LETT
ERS OF INSTRUCTIONPLUS OPERAND, EG. F0 3
5, B A V(1)"
5040 INPUT "": PRINT #0:"PRESS ANY KEY T
O CONTINUE": PAUSE 0: CLS
5100 PRINT "STANDARD COMMANDS"Z$
5110 PRINT "NEW""SAVE""LOAD""HELP""V
ALUES""EXIT"

```

```

5120 INPUT **: PRINT #0;"PRESS ANY KEY T
0 CONTINUE": PAUSE 0: CLS
5200 PRINT "DIRECT ENTRY COMMANDS"Z%
5210 PRINT "RUN - RUN STORED PROGRAM"~P
R08 - ENTER PROGRAMMING MODE""ALL LOGO
INSTRUCTIONS"~EXCEPT REPEAT & AGAIN"
5220 INPUT **: PRINT #0;"PRESS ANY KEY I
0 CONTINUE": PAUSE 0: CLS
5300 PRINT "PROGRAM ENTRY COMMANDS"Z%
5310 PRINT "LIST""LIST""DEL - OMIT LA
ST LINE""PUT - INSERT AN INSTRUCTION""
EDIT - AMEND THE PROGRAM""END - ENTER D
IRECT ENTRY"
5320 INPUT **: PRINT #0;"PRESS ANY KEY T
0 CONTINUE": PAUSE 0: CLS : RETURN
5999 REM XXXX MOODE XXXX
6000 PRINT AT 1,1;"LOGO-R"" ROBERT GLA
VAS"" COPYRIGHT 1987 A.D": PLT 0,0: DR
AM 255,0: DRAW 0,175: DRAW -255,0: DRAW
0,-175: RESTORE 6000: FOR F=6000 TO 600
78: READ A: POKE F,A: NEXT F: RETURN
6010 DATA 59,A,225,17,0,5,29,235,42,61,
92,115,35,114,201,59,A,33,58,92,126,254,
0,140,175,54,0,13,254,11,40,9,254,10,4
0,19,51,A,195,3,19,229,245,33,5,0,175,34
,66,92,58,68,92,241,225,54,255,35,203,25
4,195,125,27
6020 DATA 33,0,64,17,80,195,1,255,23,237
,176,201
6030 DATA 33,80,195,17,0,64,1,255,23,237
,176,201
7000 REM ONCE PROGRAM HAS BEEN
COMPLETED IT CAN BE SAVED T
O AUTO-RUN WITH SAVE "LOGO-R" L
INE 0

```

## PROGRAMMING: AMSTRAD CPC

## String Finder

Alastair Scott

**Y**ou can find the location of any hex or Ascii string in memory with this fast machine code routine. All the

addresses are printed in hex

To use the machine code on its own the syntax is, `C$="string to be found":  
:FIND.@C$`

```

100 'String Finder
110 'by Alastair Scott July 1987
120 MODE 2:INK 0,0:INK 1,26:BORDER 0
130 DEFINT A-Z:INDENT 1,10,5,5:K=CHR(24)
140 IF PEEK(MEMO<1) THEN GOSUB 310
150 PRINT K$; STRING FINDER "M
160 LOCATE 1,3:PRINT "Find hex or ASCII string? [N/A]
170 IF K="M" WHILE "F"=INKEY AND K="O" OR K=ASC(CHR(INKEY))
180 PRINT
190 IF K="F" THEN GOSUB 240 ELSE GOSUB 290
200 LOCATE 1,7:PRINT "String found at locations ... "
210 LOCATE 1,9:INKEY WAIT 99:INKEY WAIT

```

```

220 PRINT "a" Press any key to run again "a"
230 CALL LOG10:RUN
240 INPUT "Enter hex string ",h$
250 IF LEN(h$)MOD 2=1 THEN 240
260 c$=""FOR a=1 TO LEN(h$)/2
270 c$=c$+CHR$(VAL("&H"+MID(h$,a*2-1,2)))
280 NEXT a:RETURN
290 INPUT "Enter ASCII string ",c$
300 RETURN
310 FOR a=65535 TO 65535
320 READ b$:POKE a,VAL("&H"+b$)
330 NEXT a:CALL LOG10:RETURN

```

```

340 DATA01,BF,BE,21,FB,BC,C3,01,BC,BE,BC,C3
350 DATA03,BE,4E,4F,4E,C4,00,00,AE,00,B6,B6
360 DATA01,7E,32,CE,BE,32,08,BE,23,5E,23,56
370 DATA03,03,BC,BE,34,32,B1,BE,21,01,00,7E
380 DATA01,00,CC,BB,BE,7D,7B,84,20,5F,C9,0E
390 DATA00,0D,21,00,06,7E,00,4E,00,8B,20,11
400 DATA03,00,23,0C,7F,FE,0E,20,F0,C0,04,BE
410 DATA02,00,20,C0,5A,BB,C9,06,2B,10,FD,7E
420 DATA0C,E4,BE,7D,2F,0F,0F,0F,0F,C0,ED,BE
430 DATA01,E4,0F,C4,91,27,CE,40,27,C3,5A,BB
440 DATA00,00.00.00

```

## Space Blaster

John Taylor

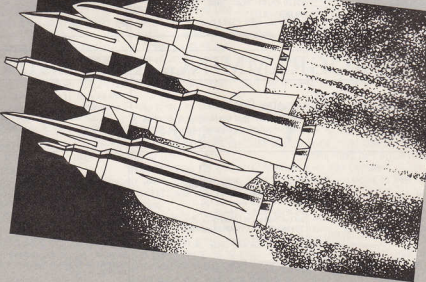
Part three of the machine code blasting game is presented this week. And that's it. Go to it.

```

2500 DATA 25,02,55,2A,02,05,FF,00,00,00,00,2A,00,00,00,00,00,2A,00,00,990
2560 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1120
2580 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,805
2590 DATA 02,3C,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1650
2600 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,3060
2610 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,395
2620 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,2050
2630 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1651
2640 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,819
2650 DATA 04,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,977
2660 DATA 03,05,24,03,05,24,03,05,24,03,05,24,03,05,24,03,05,24,03,05,24,3130
2670 DATA 24,23,01,20,03,75,00,00,00,00,00,00,00,00,00,00,00,00,00,00,995
2680 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,2314
2690 DATA 18,31,00,18,20,3A,00,2A,70,00,00,00,00,00,00,00,00,00,00,00,1001
2700 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,2779
2710 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1209
2720 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1952
2730 DATA 3E,02,74,3F,0A,54,0F,75,00,0F,75,00,03,75,40,34,00,00,00,00,1701
2740 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,432
2750 DATA 03,00,20,0A,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1504
2760 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,2500
2770 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1720
2780 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1545
2790 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,2040
2800 DATA 03,07,00,03,07,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,326
2810 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1114
2820 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,2000
2830 DATA 00,2A,00,2A,00,2A,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1352
2840 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,2520
2850 DATA 05,70,00,05,70,3A,00,70,3A,00,70,3A,00,70,3A,00,70,3A,00,70,3A,3570
2860 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1100
2870 DATA 15,0A,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,2070
2880 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1957
2890 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1630
2900 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,795
2910 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,401
2920 DATA 45,00,00,54,00,00,54,00,00,54,00,00,10,00,00,00,00,00,00,00,337
2930 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,521
2940 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1094
2950 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,401
2960 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,10
2970 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,141
2980 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,200
2990 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,244
3000 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,287
3010 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,321
3020 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1513
3030 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1923
3040 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,204
3050 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,274
3060 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1777
3070 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,646
3080 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,957
3090 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1951
3100 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,600
3110 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1513
3120 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,731
3130 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,326
3140 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1702
3150 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,892
3160 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,795
3170 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1270
3180 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1203
3190 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1850
3200 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,795
3210 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,964
3220 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1744
3230 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,500
3240 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,500

```

READY.



## Newpause

D Nash

The problem with the Spectrum's PAUSE command is that if you press a key while it is pausing, then it ends immediately. This routine acts like the normal PAUSE except that it is unaffected by any key presses. To use the command run the listing then enter *RANDOMIZE N* and *LET L=USR 65500*, where N is the time in 50ths of a second.

```
100 REM PAUSE II BY D.NASH 1987
110 REM
120 LET START=65500
130 FOR I=START TO START+16
140 READ A
150 POKE I,A
160 NEXT I
200 DATA 237,75,118,92,118,11,120,254,0
,32,249,121,254,0,32,244,201
```

## Angle

Christopher Harbron

Print text at any angle in graphics mode with this BBC procedure. The best results are achieved in modes 0, 1 and 4. The syntax is *PROC ANGLE(A\$, W, X, Y)* where A\$ is the string to be printed, W is the angle of elevation, and X and Y are the co-ordinates.

```
>LIST
10000 DEFPROCANGLE (A$,E$,XC%,YC%)
10010 A%=10:X%=0:Y%=12
10020 C=COSRADE%:S=SINRADE%
10030 FORB%=1TOLENA$
10040 ?&C00=ASC MID$(A$,B%,1)
10050 CALL&FFF1
10060 FORR%=1TOB
10070 FORP%=0TO7
10080 IF ((2^P%)AND?(&C00+R%))>1 PLOT69,XC%+
(32*(B%-1)+4.5*(7-P%))*C-(4.5*(B-R%))
*S,YC%+(32*(B%-1)+4.5*(7-P%))*S+(4.5*(B-R%))
)*C
10090 NEXT,,
10100 ENDPROC
```

## Audio Warning

Christopher Guest

This small program for the C16/+4, will makes your keys squeal in agony when you beat them. To turn the bleeping on enter, *SYS 1552* and to turn it off hit *Run-Stop/Return*.

```
5 T=0
10 C=DEC("610")
20 FOR I=1TO8
30 READA$
40 FORP=1TOLEN(A$)STEP2
50 B%=MID$(A$,P,2):A=DEC(B%):T=T+A
60 POKEC,A
70 C=C+1
80 NEXT P:NEXT
90 IF T<9888 THENPRINT"ERROR":STOP
100 DATA"78A920801203A906801303"
110 DATA"5869EAEAEARASC6EAC94000"
120 DATA"09A90080F06E84C42CE20"
130 DATA"36064C42CEAD0F06C5C6D0"
140 DATA"0160A5C6800F06A9FF800F"
150 DATA"FFA93F8D11FFA200A000E8"
160 DATA"E0FFD001C8C004D0F6A900"
170 DATA"8D11FF60"
```

## Attention!

Unfortunately due to the sheer volume of submissions our returns department has been unable to cope satisfactorily. So, from now on we are requesting that you include a suitable stamped addressed envelope for return of your submission. Not enclosing a suitable SAE will mean that your program will not be returned. You have been warned.

The beneficial side of this system is that

90% of submissions will be returned within one week. A small price to pay for such a service I'm sure you'll agree.

With regards to future submissions we are looking for articles on programming in general, utility programs and applications software and lastly, good games. Here are a few types of program we don't want: Educational, hangman, pools predictors, mastermind, flashing borders, bank ac-

counts, disc catalogues and clocks.

If you can't get a program listing in the magazine to work ring in to see whether it was faulty rather than writing. If there were problems then we'd let you know. Corrections normally appear a couple of weeks later. Thanks.

Duncan Evans  
Technical Editor

## A MUCH BETTER DEAL - WEEK AFTER WEEK

<b>Amstrad PCW 8256 Computer/Ward Processor + Monitor + Printer</b>	
RSP	WAVE
458.95	355.55 (A)
<b>Amstrad PC1512 Business Pack including PC1512 double drive memo + DMF3000 printer + Separator 3 + Workstar 1512</b>	
RSP	WAVE
577.10	588.50 (ANC)
<b>Bondwell SW34 twin drive, green screen SAGE inc. 12 month on site warranty</b>	
RSP	WAVE
763.25	583.10 (ANC)
<b>SBC FD PCXT 640K Twin drive, Green Screen inc. 12 month on site warranty</b>	
RSP	WAVE
688.85	527.00 (ANC)
<b>Commodore Amiga A500 inc. Free Deluxe Paint..... RRP 75.95 + Free £50 Holiday Voucher</b>	
RSP	WAVE
573.85	419.16 (ANC)
<b>CF2 3" DS/for all 3" drives (assort) box of 10</b>	
RSP	WAVE
18.94 (D)	
<b>Bulk by BASF, Xerox, RPS, etc. 5.25" DS/DD PKT 25</b>	
RSP	WAVE
9.57 (D)	
<b>Bulk by Wabash, Datatech, RPS, etc. 3.5" DS/DD 135 TPI PKT 10</b>	
RSP	WAVE
15.83 (D)	
<b>Ribbons, Printer - PCW PKT 5</b>	
RSP	WAVE
24.75	12.70 (D)
<b>Leoscript 2, PCW (+ VAT 56P)</b>	
RSP	WAVE
19.95	16.50 (D)
<b>DD-1 Disc drive CPC 464</b>	
RSP	WAVE
153.95	150.00 (D)
<b>Epson LX80 Printer (Printer)</b>	
RSP	WAVE
275.00	183.75 (A)
<b>Pace 2nd 5.25" disc drive inc. T-DOS utility disc</b>	
RSP	WAVE
199.90	146.00 (A)

All current chart games software retail less 25% + £1 P&P  
Send 3 10p stamps for fast moving items price list. WAVE PRICES EXCLUDE VAT.  
ANC 3 day £8.00. Next day £12.50. Admin. Offices. Callers by appointment only.  
UK Post & Ins. (A) £5.00 (B) £4.00 (C) £3.00 (D) £2.00 (E) £1.00 (F) 50p.  
Despatched by return of post. Prices in this advert are valid for 14 days.

**W.A.V.E. (Dept. POP 708)**

Walney Audio Video & Electrical  
53 Shearwater Crescent, Barrow-in-Furness,  
Cumbria LA14 3JP. Telephone: 0229 44753

THE

**AMIGA**  
CENTRE, SCOTLAND

## SOFTWARE CATALOGUE (Part 2)

Alien Fires ..... 35.00 Deluxe Paint II ..... 112.00  
Deluxe Video 1.2 ..... 112.00 Flight Simulator II ..... 44.00  
Digi-View (including A500/A2000 adaptor) ..... 185.00

Earl Weaver Baseball	44.00	Hollywood Strip Poker	19.00
Earth	5.00	IBM PC Cross Dev Package	27.00
ESB Tennis A1, A2 and A3	13.00	Infidel	28.00
Explores, The	44.00	Infobase	PC/A
Exchange	26.00	Instant Music - Rock	29.00
Expert Systems Kit	68.00	Instant Music - Rock	29.00
Fairy Tale Adventure	41.00	JET	44.00
Fantasia	44.00	Jewels of Darkness	19.00
Fast Fetti	44.00	Jumpdisk: Disk Magazine	3.50
Financial Time Machine	36.00	K-Save 80000 Assembler	19.00
Football Clubhouse	44.00	Kampanigames	28.00
First Letters And Words	44.00	Karate	19.00
First Steps	44.00	Karate Kid II - The Game	22.00
Flight Simulator II	41.00	Kay Genie	44.00
Sammy 7 and 11 - each	21.00	Keyboard Cadet	36.00
Flip-Side	52.00	Kid Talk	44.00
Flow-Way Processor	85.00	Kin Information Systems	PC/A
Forms in Flight	60.00	Kin plus Remind	PC/A
Fractal Action	44.00	Kinderway	36.00
From And Ernest	26.00	King of Chicago	44.00
Galactic Invasion	22.00	King's Quest I, II, III	44.00
Galled Renaissance	87.00	Land Of Legends	36.00
Gale	44.00	Lattice C Compiler v3.1	186.00
Game Probability	41.00	Lattice MacDraw	PC/A
GO! Championship Football	23.00	Lattice Make	111.00
Golf	30.00	Lattice MP-200 C Compiler	PC/A
Golfing	37.00	Lattice Panel Screen Design	PC/A
Golf	37.00	Lattice Screen Editor	80.00
Grand Slam Tennis	44.00	Lattice Text Utilities	48.00
Grand Slam Tennis v2.0	52.00	Lattice Utilities	PC/A
Graphical	44.00	Leadboard Tournament	39.00
Gridiron Football	87.00	Leather Guidelines	26.00
Guild of Thieves	30.00	Leopard Tutor: Dutch, French, German, Greek, Italian, Portuguese, Russian, Spanish	each at 26.00
Guns	36.00	Local Computer People	25.00
Hacker	22.00	Logic Simulator	52.00
Hacker 2: The Adapt	23.00	Low Level Basic	52.00
Hacker Package	PC/A	Low Level Basic	52.00
Halley Project	39.00	LTC File	154.00
Har	39.00	LTC Manager	154.00
HGTTT	39.00	LTC Writer	154.00
Hole-In-One Golf	39.00	Lucas: Name	36.00
Hollywood 16-Joe	39.00		

**FORMS IN FLIGHT**  
30 Drawing and Annotation sheets (16x10 in) ..... 00.30

**RAY TRACER**  
30 in 4850 others ..... 11.00

**ANIMATOR: APPRENTICE**  
Create Disney style 3D animation ..... 199.00  
Animator Junior ..... 52.00  
Demonstration Disk ..... 7.00

All prices include VAT and postage (UK orders)

Callers: Tues-Sat 10.00am to 6.00pm

Telephone: 031-557 4242

24 hours VISA Card Service

\* Send S.A.E. for full catalogue \*

AMIGA Centre Scotland, 4 Hart Street Lane, Edinburgh EH1 3RN

ROLLING UP  
SOON...



BY STAVROS FASOULAS CBM 64/128

THE  
QUEST FOR  
ULTIMATE  
DEXTERITY

THALAMUS



**FREESCAPE™**  
**IS THE NEW  
DIMENSION**

## ADVERTISEMENTS

Popular Computing Weekly is happy to accept advertisements which require our own production and typesetting. Although every advertisement is carefully checked during production, occasionally typographical errors do occur in publication.

We therefore ask advertisers to assist us by checking their advertisements carefully, after publication, and advise us immediately should an error occur.

We regret that we cannot be held responsible for more than ONE incorrect insertion and that no republication will be granted in the case of typographical or minor changes which do not affect the purpose of the advertisement.

**POPULAR COMPUTING WEEKLY**





with Kenn Garroch

## Cumana/QL pin layout

W Hayes of Tivendale, W Midlands, writes:

**Q** I have a QL and a Cumana 3½ inch 1 megabyte disc drive and I have just bought an Atari STFM. I would like to use the Cumana as a second drive for the ST but I don't know the pin configuration for the 34 pin plug on the drive to allow me to connect to the ST disc port.

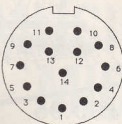
I wrote to Cumana about a month ago but it looks like being the old deaf ear treatment I've been getting from these companies for the past five years or so. Is it possible to show the pin layout in your column as there must be other readers out there with a similar problem?

**A** As far as I know, the 34 pin connection on the disc drive is a standard format, as used on the BBC, Amstrad, QL, etc. The trouble is that I am not totally sure of four of the functions, namely, load head, and write enable on the drive side, and write gate and motor on on the ST.

However, perhaps the following will be of some help, and if anyone knows the details, perhaps they could let me know.

Drive	ST
32 Side select	Select side 0
30 Read data	Read data
28 Write protect	Write protect
26 Track 0	Track 0
24 Write enable	?Write gate?
22 Write data	Write data
20 Seek step	Step
18 Direction	Direction in
16 Load head	?motor on?
12 Drive sel 1	Select drive 1
10 Drive sel 0	Select drive 0
8 Index	Index pulse

All odd numbers on drive side are ground.



- 1 Read data
  - 2 Select side 0
  - 3 Ground
  - 4 Index pulse
  - 5 Select drive 0
  - 6 Select drive 1
  - 7 Ground
  - 8 Motor on
  - 9 Direction in
  - 10 Step
  - 11 Write data
  - 12 Write gate
  - 13 Track 0
  - 14 Write protect
- Do not connect shield on ST side

## ST disk socket.

## Caught in a Triangle

Kerry Blake of Polebrooke, Peterborough, writes:

**Q** Having recently bought a 520 STFM, I decided that I should upgrade to a 1 megabyte disc drive, namely the Triangle. With these two excellent products, I had no problems until I tried to boot a protected disc in drive B. As the ST always boots any disc in drive A after power up, I would like to know if there is any way to boot the disc in drive B on power up, without going through Gem. Is it possible to install a suitable program to make the ST boot on drive B, or make the Triangle drive A. Have you any ideas on the subject, is there a product available which would solve the problem, or have any readers got any ideas on how to do it?

**A** The ST always boots to drive A because the operating system Rom tells it to. This would seem to preclude any possibility of using a program to change them over since, after power down, all

programs in ram are lost. However, it may be possible to use an auto program on the disc in drive A to run the auto program in drive B. This would involve the use of Gem's Exec call. You might try a machine code auto program (in the auto folder) that, from drive A, executes the file in drive B's auto folder. I'm not too sure how this would affect the protection on disc B. It shouldn't make any difference but some protections are strange (to say the least) so it might.

From a hardware point of view, swapping over the drive select lines should do the trick but it would invalidate your warranty since drive A is internal as is its select line. It is unusual for software to be distributed in double density since all ST drives read single density discs. I don't know of any available hardware to solve the problem so it looks like, unless the first suggestion works, you're stuck.

## Memotech: a letter missing

M J Burrows of Warrington, Cheshire, writes:

**Q** I have read letters in your magazine, from various people praising the Memotech MTX 512 computer and so, when the price of these machines recently fell to £40.00, I decided to order one.

The machine duly arrived and on unpacking, I was very impressed by the appearance, the keyboard, and the plethora of sockets on the back.

After a quick flick through the manual, I powered up the machine to see what it could do. I was a bit perturbed to see that the 'R' of the ready was missing and after entering on of the short demo programs in the manual, was even more perturbed to see that the first character of every line number was missing. Also, when printing to the screen, the first character on every line was lost.

At this stage I rang the supplier thinking that there was something radically wrong, only to be told that 'it was a quirk of the machine' and that most software has been 'designed to overcome this problem'. A chess pro-

gram was included in which the first character of every line of every instruction screen was lost. Obviously not designed to overcome this 'quirk'.

Can you tell me if this is a problem experienced by all Memotech owners, or is mine a very early issue machine, hence the low price, while later models having been corrected. Can any adjustment be made?

I would be very disappointed had I paid the full price asked when these computers were first introduced.

Having said all that, it still seems an impressive machine, especially for the current price, despite the 'quirk' (I own a Spectrum as well). Could you please print the address of the MTX users group?

**A** I am no expert on MTX machines so, I can't be of much help. However, it may sound silly, but have you tried adjusting the horizontal screen position of the picture? On a TV, this is usually a control at the back somewhere, and most monitors also have a similar adjustment. If this is not the fault then could any MTX user who knows a fix, let me know?

An MTX user group can be reached by sending an SAE to: Phil Eyles, 23 Denmead Road, Harefield, Southampton SO23 5GS.

## Double density on Amstrad

D J Perry, of Norwich, Norfolk, writes:

**Q** I have an Amstrad 8512. Is it all right to use ordinary CF2 discs in the bottom drive of my computer? Previously I have used CF2 DD discs, but these are expensive and if it is OK to use the others it would be cheaper. Are CF2 discs more likely to get corrupted than CF2 DD discs?

**A** The only real difference between single and double density discs is that the latter are tested and certified to be double density. However, both types have similar disc material, and since you have to make back up copies, using single density discs in a double density drive should not cause too many problems.

# AMIGA

- Amiga 5000 TV with AS21 TV/composite modulator £475\*
- Amiga 5000M with A1061 high-res colour monitor £695\*

(\*These prices require Commodore Amiga vouchers, valid until 12th September only) Prices include 15% VAT, a FREE copy of DeLuxe Paint, FREE delivery to your door, one year warranty. Overnight delivery £15

- Amiga 2000 with 1MB RAM, ESD 3.5" disk, mouse, software £1099
  - Amiga 2000M: with A1001 high-res colour monitor £1399
  - Amiga 2000 XTM As above, plus PC XT bridge board & floppy £1899
  - Amiga 2000 HDM As 2000M £1999
- 1 YEAR ON-SITE MAINTENANCE WITH EVERY 2000 AMIGA SYSTEM... PLUS FREE GOLDEN KEY CARD!
- stay at over 200 top hotels as often as you like for a year, and for each night's stay, just pay for breakfast and dinner!

# PERIPHERALS AMIGA

- AS01 plug-in RAM/disk 512K £105
- AS21 TV/composite modulator £25
- A1081 high-res colour monitor £335
- A1010 3.5" external disk drive £225
- Camana 2.5" external disk drive £149
- A2010 3.5" internal disk drive £199
- A2052 2MB internal RAM £399

- A2084 PC-XT bridge board with 5.25" internal disk drive £529
- A2286 PC-AT bridge board with 5.25" internal disk drive £749
- A2896PC 20MB internal hard disk with MS DOS controller £529
- A2996 2MB internal hard disk with Amiga DOS controller £629
- Highbridge 2MB add-on RAM £469
- Xerox 4620 colour printer £1219
- HP LaserJet laser printer £1995
- HP LaserJet Plus £2995

# CREATIVITY AMIGA

- ViaWrite DeskTop £139.95
- Word Perfect £39.95
- City Desk £39.95
- Page Setter 99.95

- Scrubble II £89.95
- DrigPilot £59.95
- De Luxe Paint II £119.95
- De Luxe Video II £119.95
- Amiga VideoScope £179.95
- Amiga Animator £99.95
- De Luxe Music £84.95
- Sophus stereo sound digitiser £139.95
- SoundScope Pro Midi Studio £154.95

# PRODUCTIVITY AMIGA

- SuperBase Personal £89.95
- Acquiltion £274.95
- Logisix £139.95
- Analysix II £94.95
- SAM Basic £9.95

- True Basic £59.95
- True Basic libraries £39.95
- K-Seka Assembler £64.95
- MCC Pascal £74.95
- A.C. Fortran £249.95
- Latitex C 2.1, 2.3 £149.95
- Amiga Draw Plus £214.95
- Dynamic CAD £389.95
- Cherry A3 Digitizing Tablet £449.95
- Easy A4 Drawing Tablet £414.95

# 128 64C

- Commodore 1280 computer £435
- Commodore 128 computer £239
- 512K expansion RAM £149

- Commodore 1281 disk drive £239
  - 1901C colour monitor £275
  - 64C computer £189
  - 5141C disk drive £189
  - 64C Commodore Collective £245
- Prices include 15% VAT, FREE delivery to your door, and one year warranty. Please add £15 for overnight delivery.

## UNBEATABLE SUPERBASE & SUPERSCRIPT BARGAINS!

- SuperBase 128 £44.95
- SuperScript 128 £44.95
- SuperBase: The Book £11.95
- SuperBase 64 & Plus4 £34.95
- SuperScript 64 £34.95
- SuperBase Starter 64 £19.95

## MORE SOFTWARE BARGAINS FOR YOUR C64 AND 128!

- ViaWrite Classic 128 £79.95
- ViaWrite 64 (disk) £39.95
- ViaWrite 64 (cartidge) £59.95
- ViaStar 128 £99.95
- ViaStar 64 £39.95
- ViaStar 64 XL £69.95
- GEOS 64 V1.3 £64.95
- SwiftCalc 128 £54.95
- Data Manager 128 £54.95
- WordWriter 128 £54.95
- Pocket Planner 128 £44.95
- MicroClerk 128 £44.95

## COMMODORE 128 and 64... PROGRAMMER'S CORNER

- PeiSpeed 128 £42.95
  - Orford Pascal 128 £42.95
  - Super C 128 £42.95
  - Cobol 128 £42.95
  - Hack Pack 128 £34.95
  - RunBox 128 £34.95
  - C128 Tricks and Tips £34.95
  - BrushBox 128 £34.95
  - Super Disk Doc £34.95
  - Smart's Basic 64 £19.95
  - PeiSpeed 64 £19.95
  - Orford Basic 64 £19.95
  - Orford Pascal 64 £19.95
  - Orford Pascal 64 (cartidge) £19.95
  - Super C 64 £19.95
  - Cobol 64 £19.95
- The Basic 128 compiler, 8000 Oxford Systems  
The complete J & W Pascal for your 128  
Complete C language, with extensions  
The complete COBOL package from Abacus  
In-line Programmer's Toolkit & Run-Disk  
Lightning fast Run-Disk for 512K expansion RAM  
Complete reading for the 128 programmer  
Supports IEEE/PDT disks & printers etc. (128 & 64)  
Rescue your lost disk (1041/7071/4000)  
Programmer's cartidge from Commodore  
The standard 64 Basic compiler from Oxford  
All-in-one Basic compiler, include compiler  
The complete J & W Pascal for your 64  
Pascal for 64 tape users, as above  
Complete C language, with extensions  
The complete COBOL package from Abacus

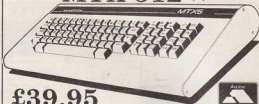
IF YOU WANT IT TOMORROW... CALL US TODAY! ON 01-546-7256

Prices are POST FREE & include VAT  
Order by phone with your credit card  
or send cheque/PO or your credit card  
number. Order's welcome.  
We despatch same day by FIRST CLASS  
post. If our lines are busy, why not try  
our 24-hour recorded order service, on  
01-541-5185



LAKEVIEW HOUSE, KINGSTON HILL, SURREY, KT2 7QT. TEL 01-546-7256

# MEMOTECH MTX 512



£39.95

Plus £3.05 postage (total £43)

- ☆ 64K User Ram ☆
- ☆ Z80 Processor ☆
- ☆ 3 Channel Sound ☆
- ☆ 16 Colours ☆
- ☆ Extensive Software ☆
- ☆ CP/M 2.2 Adaptable ☆
- ☆ Fully Guaranteed ☆

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

Further details/orders to:

## UK HOME COMPUTERS

82 Churchward Avenue, Swindon, Wilts SN2 1NH  
Tel: 0793 695034

## SPECTRUM SUMMER SALE

£1.99 EACH

Wintarplots, Tales, Who Dares Wins II, Adrian Miles, Starburst, End, Endbaze, Mad Shadow, Sherlock, Hung, Garry The Gen, Respin, Costa Capers, Ransstone, Equinox, Cop Out, American Football, City Slicker, Revolution, Vultures, Vultures II, 17 Saboteur, Amazon Women, River Road, Young Dines, Twister, Battle Of The Planets, Rescue On Fractalus, Sir Lancelot, Surf Champ, Paradoxes, Mugsy, Firelord, Matabels, Riders Den, Chimera, Frost Byte, International Karate, Spider Man Kiki, Petal II, Zorro, Bounder, Starstrike II, Adventure Land Secret Mission, Sam Stee's Saboteur, 3 Weeks In Paradise, Contact Sam Cruise, Starbuck, Chickens Chase, Toy Bizarre, Reelin Of Impossibility, Mantronic, Normal, I Of The Mask, Night Gunner, Zoids, Gyroscop, Super Sleuth, Jet Set Willy II, Virgin Atlantic Challenge, Chicken Egg II, Red Arrow, Pole Position, Galaxian, Super Chess 3.5, Mugsy, Ghostbusters, Speed Darts, B.O. Darts For Tots, Fighting Warner, Reco, Hot Shots Compilation, Willy Wobblers, Hacker, Warriors Snooker, Xcal, Brian Jacks Superstars, Robin Di Sherlock.

# 48K SPECTRUM ROTRONICS WAFADRIE

★★★★★★★★★★★★

FANTASTIC SAVINGS ONLY

☆ £14.99 ☆

+ £2.50 p+p  
Inc. 164K Wafer

£2.99 EACH

Adventure Quest, Superbow, Dragon's Lair, Sold A Million, Vectron 3D, Pac-Man, Future Knight, Avenger, Crystal Castles, Masters Of The Universe Arcade, Highlander, Prodigy, Torzan, War, Xenopus, Pentagram, Football Manager, Evil Crown, Pyroscop, Impassable, Tapper, Trail Blazer, Keweenaw, Sabal Pioneer, Jet Pac, Fighter Pilot, Bitch Hard Gay, Loops, Martindale's Return To Oz, Money On The Run, War, Unknown, Hives, Southern Bell, Arc Of Ye Sed, Legend Of Kafe, David, Aspin Clave, Way Of The Tiger, Terra Costa, Uchi-Mate, The Comic Genre, Fantasy, Kalkut, Infinitor.

★★★★★★★★★★★★

- RS232 Lead.....£10.50
- Centronics Lead.....£10.50
- Currah Microsail.....£2.95
- Spectrum.....£25.00

p&p 1-3 titles 85p  
3 or more £1.00  
Overseas £1.20 per tape  
CHEQUES PLEASE TO

## COMPILATION TAPES £2.99

Crash Smashers II, Star Games I, Unbelievable Ultimate, Scott Adams Spoons, Abacus Hall of Fame.

## LOGIC SALES LTD

17 Leofric Square, Eastern Industry, Peterborough, Cambs. Tel: 0733 313670

# THE MUSIC OF MANY MICROS

Mark Jenkins reviews packages from the American company Sonus, for the Commodore and Apple ranges, IBM PC and compatibles, and the Atari ST.

**T**his week we're looking at a whole new range of software which is being imported into the UK for the first time.

The packages all come from Sonus, an American company which has been working in the music software field for a couple of years now. At first concentrating on the Commodore 64 and Commodore 128, they've now branched out with packages for the Apple (Ile, II+, Macintosh and GS versions), Atari ST and IBM PC compatibles. The range covers everything from sequencers to Midi event editors, sound editors and more exotic applications such as drum pattern librarians, and is backed up with an extensive selection of hardware which should allow anyone's micro to go Midi.

Sonus' pride and joy is the *Super Sequencer*, available for the C64/128 and Apple Ile/GS. The Commodore versions both use all the available memory on their respective micros, which should give pretty impressive note capacity, particularly in the case of the C128 version.

*Super Sequencer* includes a storage routine for MIDI System Exclusive data, so it can also be used for saving, for instance, entire banks of DX sounds. The basic screen layout resembles a multitrack tape recorder and mixer; fast forward and reverse, mute and unmute and punch in/out, with assignable velocity, channel and name for each track are all there.

Editing routines allow individual sequences to be time-shifted and you can delete pitch wheel, modulation or patch change information. The software's also capable of treating movements of a synth's modulation wheel as volume data, so on a suitably equipped selection of synths you could create an automated mixdown.

Individual sequencers can be arranged into a song, with short sections or the whole song capable of being transposed to a different key. 24 sections can be used and each of these can contain a sequence repeated up to nine times (not a very meaningful figure musically, but there you are). Four complete songs can be held in memory at any one time, and a *Captive Play* Thru function allows you to control any



connected Midi synth while you're programming via the sequencer package.

*Glass Tracks* is a budget sequencer for the C64/128 and Apple Ile/II+/GS which will allow you to record, erase and transpose sequences, set Midi channel assignment and velocity, auto correct and store eight sequences on eight tracks. Demo songs from classical, rock and other styles are included.

*Midi Processor* is an editing package which allows you to alter individual Midi events stored in *Super Sequencer* files. It will allow you to de-merge information which has been combined onto a single track, and should be useful for tidying up your more spontaneous performances.

*MidiTech 64* is a "Universal System Exclusive Librarian" which will store patches from any synth capable of dumping them - dump requests for the CZ101, RX11, DX/TX, FB01, Korg Poly 600 and LinnDrum are included, but you can create any dump request needed as long as the necessary codes are included in your instrument's handbook.

The *DX/TX Double Banked Librarian/Programmer* will edit sounds for two DX synths simultaneously and will store them on disc for fast recall. Performance memories are saved too, and 320 new sounds are includ-

ed on the disc. The package will allow you to program and play a TX7 without a DX7 being present, but is not as yet compatible with the DX7MkII. Again, it's available for the C64/128 and AppleIIe/GS. A similar *RX Librarian* exists for the RX11 and RX21 drum machines, while the *FB01 Design* package will allow you to create and store new sounds for the FB01 FM synth module.

*Sonic Editor* is a sound creation and editing package for the Ensoniq Mirage and the Sequential Prophet 2000, which gives graphic waveform displays and allows you to create loops and trim samples for the best possible results. You can set all available parameters including filter and detune levels, and a joystick or paddles can be used to edit sounds. A library of useful basic waveforms is provided and these can be added together to create octaves and fifths. Sets of 78 sounds can be saved to disc, and waveform displays can be printed out.

*Sonic Editor* is available on the 520ST/1040ST, whereas the Casio CZ Programmer/Librarian and *Design Sound Disc* are only available for the C64/128. To make things even more confusing, the *Masterpiece* sequencer is available only on the ST and the Macintosh; this is a pro-level package with 32 channels, event editing, Song Pointers and, on the ST's, an optional "Super Score" package for music transcription.

The ST packages, of course, require no interface card, but Sonus manufacture hardware Midi interfaces for the C64/128 and for the PC, which runs its *Personal Musician*, *DX Editor* and *DX Design* programs. The Commodore/Apple interface has one In and Two Outs with or without tape sync, while the Mac interface has 2 Ins and six Out/Thrus, and the more professional user may want a SMPTE/MIDI Time Code interface or even an MM90 Intelligent Midi Router as well.

Over the coming weeks we'll be reviewing some of these products in more detail. In the meantime, you can contact Sonus for a catalogue and price list at PO Box 18, Wokingham, Berkshire RG11 4BP (0734 792699).

# IT'S BIGGER AND IT'S BETTER IN THE USA

Paul Fletcher takes a look at the differences between British and American bulletin boards and tells you how to get in touch with some of the more interesting competitors on the other side of the ocean.

**G**oing back to the roots of computer communications, this week we'll take a look at the US communications world.

The most noticeable difference between US and UK bulletin boards is, as usual, size. There are over 200 bulletin boards that have in excess of 250Mb on line, while a typical large UK equivalent comprises about 70Mb, most of the boards offer an off line library as well. Another major difference is in the speed of the modems used, there are a large number of boards running at speeds of up to 9600 baud, and quite a few running at 19.2K baud.

To my knowledge, the largest board in the US is Nautilus (0101 316 365 7631). Having two laser discs on line, it offers the complete 17,000 program PD Sig library on-line, together with a host of other information, in total a massive 1.6 gigabytes of downloadable data. The whole of the Nautilus program database can be searched by keywords, and you can locate a particular type of program within seconds. This is in my opinion the ultimate software distribution system.

Nautilus has multiple lines, it is also completely free, you only pay the cost of the phone call between the hours of 8 pm and 8 am it costs around £32.00 per hour to dial the US direct, at current British Telecom and Mercury charges.

There are several other interesting developments in the US Bulletin Board world, one of the amusing being Ansi Music. This uses a series of codes to transmit tone commands to your computer. However, your computer must be capable of handling these commands.

Ansi Music can be found on several boards, including Paul Waldinger's Sound of Music board (0101 516 536 8723), which has over a dozen file areas, six conferences, and three lines.

The Sound of Music Bulletin Board has a musical introduction, and a musical exit. There are also a lot of very good graphics programs, many of which are not in the UK yet. Paul Waldinger is one of the friendliest sysops I have ever come across, and grants

special access to international callers on receipt of a postcard.

Sound of Music uses PC Board as its host software, this being arguably the most flexible bulletin board software available for the PC. A full list of BBs using PC Board is available on the Brown Bag board (0279 74855/6), which is, I think, the only PC Board BB running in the UK at present.

Running under Double DOS, PC Board can cope with two users on a single PC, it also supports multiple conferences, each of which can be set to operate as a mini-board in its own right. In addition to these features it also offers DOORS, this allows a caller to access DOS applications. This is an ideal way for non-PC users to access and run PC board software.

**"The largest board in the US is Nautilus. Having two laser discs on line, it offers the complete 17,000 PD Sig library on line"**

Another interesting feature of most US boards, is their support of the EGA card. Most of them have a file area for EGA programs, until the launch of the Amstrad 1640 PC, this has not been important for most UK PC users, but with the availability of low-cost EGA systems, this could change soon.

One thing that rapidly becomes apparent is that the UK user groups, and PD 'distributors' are really out of touch with latest software. There are new developments daily, and to keep on top of things you really do need to keep in touch.

Below, I've listed 10 US bulletin boards which I've particularly liked and think are worth trying out.

1 Sound of Music (0101 516 536 8723) Graphics, sound

2 Nautilus (0101 316 365 7631) Sheer size of system

3 Token Ring (0101 201 546 1468) Range of software

4 Fountain Head (0101 801 261 8974) Range of software

5 Hi Res BBs (0101 312 279 1053) Graphics

6 Computer Playroom (0101 312 279 1053) Games

7 Sparta (0101 201 729 7056) Hard disk utilities

8 Players Network (0101 205 854 4694) Games doors

9 Trolls Cave (0101 615 242 7909) Atari ST 10 River City (0101 219 287 3358) Amiga

On a slightly more commercial scale there are several boards operated by companies as support lines for their products, even those whose products are not shareware. Also there are some people who charge a subscription fee for a years use of service, there are a few people in the UK who also operate this type of system.

In the real commercial world, there are several major services including Compuserve, The Source, BIX and MCI. In brief, Compuserve is similar to Prestel and Telecom Gold, but far more varied and advanced. The range of services and information available is far superior to any UK based service, and with a London dial access mode it is well worth subscribing to.

The Source is another information service, which although not as powerful as Compuserve, is still fascinating to look through. BIX is the Byte Information Exchange, a multi-conferencing system run by the American magazine Byte. It is quite expensive to use, but you can get a great deal of good quality advice from it. MCI is a mail service, pure and simple, and in my opinion one of the best electronic mail services world wide.

As well as electronic mail it also offers, telegram, telex, and postal delivery of your electronic mail message. It also has the ability to store a digitised company logo to use with your postal mail services in the 'States. You can send a document anywhere in the US overnight, on your own paper.



# MICRO-FILE

## DISCS

### Athene Consultants

33 Holly Grove,  
Fareham, Hants PO16 7UP  
Tel: 0329 282083

#### ALL DISCS SUPPLIED WITH LABELS AND LIFETIME GUARANTEE

Description	Price
3-5 DS/DD 10 discs .....	£11.50 inc.
3-5 SS/DD 10 discs .....	£10.95 inc.
Storage Box (holds 10 discs) ....	£1.50 inc.

Quantity Discount starts at 50 discs  
3-5 DS/DD 50 discs ..... **ONLY £52.90 inc.**  
(92p each + VAT)  
3-5 SS/DD 50 discs ..... **ONLY £49.90 inc.**  
(87p each + VAT)

Despatch by 1st class post

Remember prices include VAT, postage and labels.

Same Day Express Despatch add £1 per 10 discs (by 1st class post).

All discs by top manufacturers with a Lifetime Guarantee.

PLUS a 14 Day Money Back Guarantee.

See us at the ZX Microfair,  
22nd August, Stand 46.

To take advantage of these very low prices, send cheque/P.O. to:

### Athene Consultants

Dept (POP), 33 Holly Grove,  
Fareham, Hants PO16 7UP  
Tel: 0329 282083  
Prestel MBX 329282083



**CALL FOR THE LOWEST  
PRICES FOR QUANTITY IN U.K.** (094)

## SOFTWARE

### SOVEREIGN MAIL-ORDER

289 St Saviours Road, Leicester LE5 4HG

Tel: (0533) 490043

OPEN Mon-Sat 11a.m. to 7.30p.m.

### ATARI-AMSTRAD ST-COMMODORE SOFTWARE AND HARDWARE

100 3 1/2" SS/DD FOR £109  
ALSO 25 5 1/4" DISCS FOR £10  
5 1/4" DISCS ARE 10 FOR £3.50  
3 1/2" DISCS SS/DD 10 FOR £14.00  
3 1/2" DISCS DD/DD 10 FOR £16.00  
MOUSE MATS AT ONLY £4.50

ST MOUSE EXTENSION LEAD - £4.99 EACH  
COMMODORE POWER PACKS \$4 (CPU) FOR £12.99

#### ST SOFTWARE

SUPERBASE	£79.95
G.F.A. BASIC	£49.95
BRIDGE PLAYER	£16.99
MOUSETRAP	£12.95
PHOENIX	£16.95
PEGAS ELITE	£59.95
NINJA MISSION	£8.95
TIMEBLAST	£8.95
F15 STRIKE EAGLE	£19.95

ALL PRICES INC. VAT & P/P.

**ATARI IC40 STFM**  
Drive, Mouse and 1st Word  
and FREE software

**ONLY £459.00**

**ATARI 520 STFM**

**£285.00**

+ FREE Mouse & Mat etc.

**Apologies for the  
mistake made last  
week. The correct  
price for the 520  
STFM is £285.00**

**SEND LARGE S.A.E. FOR PRICE LIST  
AND STATE WHICH COMPUTER**

(295)

Central Media shop now open at address below

## CENTRAL MEDIA

**WE SELL  
ATARI ST  
HARDWARE**  
Ring for  
details

**3.5 INCH DISCS**  
10 DATATECH S/S D/D £9.95  
10 UNBRANDED S/S D/D £10.95  
**5.25 INCH DISCS**  
10 DATATECH D/S D/D 96tpi £8.50  
10 DATATECH D/S D/D 48tpi £8.00  
TDK S/S D/D 48tpi £7.50  
All prices inc. VAT & P.&P.

TRADE INQUIRIES WELCOME

**ALL CHEQUES & PO'S PAYABLE TO  
CENTRAL MEDIA**  
101 SPRING BANK, HULL HU3 1BH  
TEL: (0482) 26581

(208)

**WE SELL  
MSX & ORIC  
SOFTWARE**  
Please ring  
for details

**Look at this Now!**  
**Coming Soon !!!**



**Cyclops Software ...**  
**TO A COMPUTER NEAR YOU**  
**BECAUSE WE ARE NOW LOOKING AT YOU!**

(418)

## ADVERTISING RATES FOR MICRO-FILE

Semi Display £8 per single column centimetre (+VAT)  
Lineage 35p per word (+VAT)

CALL SUSANNAH KING or ROBERT COLE on 01-437 4343 FOR SEMI DISPLAY ADVERTISING

# ATARI 520 STFM NOW IN STOCK FOR NEW PRICE ONLY £279.95

Includes mouse controller, manual, language disc and other utilities

	RRP	Our Price
Mega ST 2 + SM125 mono monitor + software .....	£999.95	£894.95
Mega 4 ST + SM125 mono monitor + software .....	£1205.95	£1179.95
1040 ST + SM125 mono monitor + software .....	£599.95	£549.95
520 STFM + SM125 mono monitor + software .....	£399.99	£379.95
520 STFM + software .....	£299.99	£279.95

## Disc Drives

Cumana 1 meg drive .....	£150.00	£139.95
Triangle 1 meg drive .....	£150.00	£139.95

Other disc drives on request, please phone for details

## Monitors

SM125 mono monitor .....	£149.95	£114.95
CM36512 14" low res. colour monitor .....	£299.00	£69.95
SC1224 12" medium res. colour monitor .....	£399.00	£369.95
Philips medium res. colour monitor .....	£369.95	£299.95

**PACK 1** - Atari 520 STM complete with mouse,  
1 meg disc drive complete with manuals and demos £369

**PACK 2** - Atari 520 STFM with mono monitor  
complete with manuals and demos £379

**PACK 3** - Atari 520 STM with 1 meg drive mono  
monitor, manuals and demos at £459

## ST SOFTWARE AT GIVEAWAY PRICES

Balance of Power .....	£26.99	Brian Clough's Football .....	£19.95
Championship Football .....	£19.95	Fortunes .....	£19.95
Karate Kid II .....	£19.95	Air Ball .....	£19.95
The Pawn .....	£19.95	Hard Ball .....	£19.95
Prosound Designer .....	£47.95	Crystal Castles .....	£11.95
Colonial Conquest .....	£24.95	Quartet .....	£19.95
Hades Nebula .....	£16.95	TNT .....	£16.95
Guild of Thieves .....	£19.95	Roadrunner .....	£19.95
Arkanoïd .....	£12.95	Jupiter Probe .....	£12.95
Prohibition .....	£15.95	Death Strike .....	£12.95
Barbarian .....	£19.95	Turbo G.T. .....	£13.95
Golden Path .....	£19.95	Kings Quest 3 .....	£19.95

# AMIGA A500 NOW IN STOCK £529

	RRP	Our Price
Amiga A500 pack .....	£608.85	£528.95
Amiga pack 10" colour monitor .....	£918.85	£879.95
Amiga pack + 1081 colour monitor + 1 meg triangle drive .....	£1057.85	£999.95
Amiga 2000 .....	£1259.95	£1094.95
Amiga 2000 + 1081 colour monitor .....	£1604.25	1449.95
Amiga 2000 internal disc drive .....	£228.85	£199.95
PC kit bridge card .....	£573.85	£499.95

## AMIGA SOFTWARE AT GIVEAWAY PRICES

Balance of Power .....	£29.95
Defender of the Crown .....	£26.95
World Games .....	£19.95
Guild of Thieves .....	£19.95
Winter Games .....	£19.95
Star Glider .....	£19.95
Championship Football .....	£19.95
Swooper .....	£16.95
Deluxe Paint II .....	£129.00
Barbarian .....	£19.95
Instant Music .....	£24.95
The Surgeon .....	£39.95
Karate Kid II .....	£19.95
Kings Quest 3 .....	£24.95
Portal .....	£39.95
Faerytale .....	£39.95
Kampfgruppe .....	£24.95
Amiga Karate .....	£16.95
Phalanx .....	£8.95
Space Battle .....	£8.95
Roadwar 2000 .....	£19.95
Challenger .....	£8.95
Superhuey .....	£16.95
Uninvited .....	£24.95

More new releases this week - phone for details

Buy two games or more and deduct 50p off each game

Amiga 512 Ram upgrade .....	£99.99
Triangle 1 meg drive (Amiga) .....	£39.95
Cumana 1 meg drive (Amiga) .....	£149.95
Fight Simulator 2 .....	£39.95

This is just a small selection of our Amiga Software. Send S.A.E. for list

Other Commodore and Amiga peripherals in stock, please phone for details

We are Commodore appointed dealers

## 3.5" DISCS

3.5" 10 for £12.95

3.5" 20 for £24.95

3.5" 50 for £55.95

All prices include P.&amp;P.

Lockable disc boxes 3.5"  
holds 90, £11.95

## SOUND N VISION

11 Silk St, Leigh, Lancs WN7 1AW.

Phone now for details - Tel: (0942) 673689

Cheques and P/Orders payable to: Sound N Vision P.&amp;P./VAT INCLUDED

Visitors welcome in showroom. Send S.A.E. for price list.



## SOFTWARE

### NEED HELP? . . . well, read on

If you are an owner of Amstrad CPC or PCW, and don't ever get a chance to help other users, write reviews or air your opinions — NOW YOU CAN.

Amstrad CPC Newsletters and PCW File provide these opportunities and include hints and tips to keep you going!

But the best part is, it's **NON-PROFIT MAKING** CPC Newsletters are £5 for 6 and PCW files are £7 for 6 **FANTASTIC** issues. And, of course, you get access to the Public Domain Library **ABSOLUTELY FREE!**

What more could you ask for? Give it a go and you'll be back for more and more.

Send for a sample, just enclose a SAE you'll be very surprised.

Amstrad Computing Newsletters CPC Newsletter + PCW File

**Mr. C. A. BRYANT,**

11 Havenview Road, Seaton, Devon EX12 2PS

*'Give me a call on 0287-20456 after 7 or anytime Sunday'*

**NEWSFLASH:** We've just merged with the PCW User Group in Coventry, giving you a bigger, wider and better service!

## ESCAPE Software

\*\*\*OL - Summer Special Offer - OL\*\*\*

**OL Education Pack:** The three best educational programs for the OL! OL Spelling Tutor, OL Maths Tutor and OL Revisor. **Only £37.95**

**OL Spelling Tutor:** A unique program for teaching spelling. Use built-in vocabulary (3500+ words) or your own word lists. Includes Anagram, Hangman and Word-Search. **£14.95**

**OL Maths Tutor:** Teaches basic Arithmetical, Geometrical and Logical concepts. Includes Nim and Hi-Lo games. **£14.95**

**OL Revisor (Digtrix):** Create your own multiple choice tests! "Justifiably described... as an indispensable educational aid" OL World Feb 1987. **£14.50**

*(OL Spelling Tutor and OL Maths Tutor were compiled with Q-Liberator)*

Send cheques or P.O.s to:

**ESCAPE Software (Dept. PCW)**

2 Herley Road, Ilford, Essex IG1 2TT

Tel: 01-478 6281

(306)

## PANTHER SOFTWARE LATEST RELEASES !!!

Coming soon . . . Easy Spell!

**Company '87**

The Business Simulation  
Game for the inquisitive mind — **£14.99**

**Daily News**

Do you have the perseverance to run a  
daily newspaper? — **£9.99**

Games, Educational and Business Software for the  
Amstrad PC and IBM-compatibles

**STOP PRESS !!**

Panther Software for all machines coming soon!

2 River Way Gardens, The Meadows, Nottingham NG2 3LL

Telephone: 0602 860664

Trade enquiries welcome

(413)

## CROWN SOFTWARE

ANY PRICE AND WE WILL MATCH IT!!!

Available now

Atari 520 STFM.....	£269.95
Commodore Connoisseur Pack.....	Only £225.00
Spectrum +2.....	£119.99
Spectrum +3.....	£229.99

See quarter page advert for best rates on all software

**47 Crown Drive,  
Spalding, Lincolnshire**

Hotline: 0775 69058

(400)

## RECRUITMENT

## PROGRAMMERS GRAPHIC ARTISTS

Urgently required to join Britain's most productive and innovative software development house.

We can offer impressive all-round performance to talented and experienced 68000, 6502 and Z80 applicants, for major development projects.

Our reputation is spreading fast. . . .

- ★ Top rate royalty or outright payments.
- ★ Instant financial back-up and guaranteed payments
- ★ Europe's top arcade coin-ops and licensed projects
- ★ Professional programming support and development facilities

*So discover your true hidden potential and join the team*



THE FORCE BEHIND THE INDUSTRY

Contact:

Fergus McGovern, Probe Software Limited,  
P.I.F.C. House, 2nd Floor, 1a Church Road,  
Croydon, Surrey CR0 1SG

Tel: 01-680 4142 or 01-680 4454

(403)

## PROGRAMMERS AND GRAPHIC ARTIST REQUIRED!!

for exclusive work for

**ST, AMSTRAD, AMIGA,  
COMMODORE AND SPECTRUM**

Excellent terms of payment and of course  
all round company back up!

ALL ENQUIRIES DEALT WITH IN THE STRICTEST CONFIDENCE

**Telephone: 0633 216654**

(412)

## Walkers

COMPUTER SERVICE AND REPAIRS  
BY THE SPECIALIST

Commodore 64.....	£32.00	Vic 20, C16, C128 C+4 & BBC
Spectrum Plus 4.....	£20.00	
ZX81.....	£16.00	All £20 + parts
Interface 1.....	£16.00	
Interface 2.....	£10.00	
Microdrive.....	£15.00	All repairs carry 3 months' guarantee

Also many spares prices on application

eg Spectrum Membrane.....	£5.00
Spectrum+ Membrane.....	£10.00
Commodore 64 Power Supply.....	£26.00
Spectrum Power Supply.....	£14.00

All prices include VAT. While-you-wait service or send computer with  
cheque to include £2.00 p&p to:

**THOMAS WALKER AND SON LTD.**  
37-41 Bissell Street, Birmingham B5 7HR Tel: 021-622 4475

(398)

# STORT SOFT

## MAIL ORDER SPECIALISTS

### INCREDIBLE LOW PRICES!

ALL DISKS CARRY A NO QUIBBLE REPLACEMENT GUARANTEE. ARE CERTIFIED 100% ERROR FREE & COME WITH LABELS. 5 1/4" ALSO HAVE SLEEVES & WRITE PROTECTS AND REINFORCED HUB RINGS.

#### BLANK 5 1/4" DISKS

DISK NOTCHER FREE WITH EACH 100 DISKS PURCHASED

UNBRANDED	TRIAL 10	25	50	100	10 in a plastic lib. case
SS48 TPI	£4.50	£9.00	£17.00	£33.00	£5.50
DS48 TPI	£5.50	£11.00	£21.00	£39.00	£5.50
DS96 TPI	£6.50	£13.00	£22.00	£37.00	£7.50
DS96 TPI FLIP SIDED	£7.00	£14.00	£22.00	£38.00	£8.00
MINIC FLIP SIDED DS96 TPI	£8.95	£20.00	£38.00	£70.00	£9.95
MINIC HIGH DENSITY					
1 King	£23.00	£52.00	£106.00	£180.00	£24.00
COLORBAND - runs & matches all one colour					
SS48 TPI	£3.50	£7.00	£12.00	£22.00	£4.50
DS48 TPI	£4.50	£9.00	£14.00	£24.00	£5.50
DS96 TPI	£5.00	£10.00	£16.00	£28.00	£6.00

#### BLANK 3 1/2" DISKS

	10	25	50	100	10 in a plastic lib. case
MF100 (SS/DD)	£12.95	£30.00	£58.00	£115.00	£13.95
MF200 (SS/DD)	£14.95	£35.00	£63.00	£125.00	£15.95

#### LOCKING DISK BOXES

3 1/2" HOLDS 40	£7.95	3 1/2" HOLDS 80	£9.95
5 1/4" HOLDS 60 3" or 90 3 1/2"	£9.95		

#### BLANK 3 1/2" DISKS

	10	25	50	100
CF2	£25.00	£60.00	£110.00	£200.00
CF2DD	£33.00	£80.00	£150.00	£280.00

#### LOCKING DISK BOXES

5 1/4" HOLDS 50	£7.95	5 1/4" HOLDS 100	£9.95
3 1/2" HOLDS 40	£7.95	3 1/2" HOLDS 80	£9.95
60/90 HOLDS 60 3" or 90 3 1/2"	£9.95		

FULL RANGE OF ATARI HARDWARE & SOFTWARE - BEST PRICES - RING FOR DETAILS!

Just write for more information. Cheques etc. payable to STORT SOFT (International orders add 10% and remit in pounds Sterling by bank draft or intl. money order. Write for quote in any other currency)

ACCESS/MASTERCARD/EUROCARD/VISA accepted. CREDIT CARD ORDER LINE - 0279 89509  
24 HOURS A DAY, 7 DAYS A WEEK - NO HIDDEN EXTRAS - WHAT YOU SEE IS WHAT YOU PAY  
**18 CROWN CLOSE, SHEERING, BISHOP'S STORTFORD, HERTS CM22 7NX** (252)

### SERVICES

## FAULTY SPECTRUM?

As you are probably aware from press reports Sinclair Computers no longer have a repair department.

Our computer repair workshop has been an OFFICIAL Sinclair Repair Depot for the past six years and we are pleased to announce that we will continue to do your out of guarantee repairs as in the past.

Send your faulty computer DIRECT

SPECTRUM .....	£18.75 inc parts
ZX81 .....	£11.50 inc parts
16K RAM .....	£9.95 inc parts
MICRODRIVE .....	£15.95 inc parts
INTERFACE 1-11 .....	£18.75 inc parts

CALL OR SEND WITH CHEQUE OR P.O.

**T.V. SERVICES OF CAMBRIDGE LTD**  
FRENCH'S ROAD, CAMBRIDGE CB4 3NP  
Tel: 0223 311371

267V

#### EAST LONDON MICRO SERVICE CENTRE

Spectrum, Commodore, Amstrad, Atari, MSX plus peripherals.  
Turnaround typical of 2-5 days.  
Three months warranty guaranteed.

Postal repairs undertaken.  
Computer IC's components sold.  
Budget games, software and accessories sold. Mail order welcome. Trade enquiries welcome.

Open 9am-5pm Mon-Sat

**SAN ELECTRONICS**  
63 Pleshet Grove, East Ham  
London E6 1AD  
Tel: 01-472 4871

Four minutes walk from Upton Park Tube Station.

(254)

400/800 NOW  
XLR/KE ATARI OWNERS ST

## LOOK

Are you having difficulty finding suitable software? Then look no further. We have available for both UK and American owners one of the largest selections of both UK and American software and software utilities at discount prices and special trade regularly being offered. If you would like further information please send a large a.s.k. to:-  
CAMBRIDGE PRODUCTS LTD 60/62  
344 Warwick Avenue, Queens Road, London W1P 0LH  
TEL: 0202 40181

## COMPUTER REPAIRS

Fixed Super Low Prices!

Inclusive of parts, labour and VAT



FIRST AID  
FOR  
TECHNOLOGY

1 week turnaround  
Free collection/delivery available for local area

#### ★ INTRODUCTORY OFFERS ★

SPECTRUMS	£14 inc. + Free Game
C64	£22 inc. + Free Game
C16	£18 inc.
VIC20, C+4	£22 inc.
BBC	£32 inc.
ELECTRON	£19 inc.
AMSTRAD 464	£32 inc. + Free Game
C & N CASSETTE UNITS	£19 inc.
C64 P.S.U. FOR SALE	£20 inc.

Please enclose payment with item - 3 month warranty on repair  
Please enclose advert with repair

**W.T.S. ELECTRONICS** (182)

5-9 Portland Road, Luton, Beds LU4 8AT. Tel: 0582 458775. Telex: 265871

#### FAST COMPUTER REPAIR CENTRE - IN LONDON

\*BBC Micro, Commodore, Amstrad, Spectrum

\*Amstrad, Others

\*We sell spare parts

\*Used Micros bought and sold

\*Egom Programming Service

Phone: 01-863 7166

#### PROMPT ELECTRONICS

Unit 4, 15 Springfield Hall,  
Harrow, Middx HA1 1QF  
(entrance in Annersham Road) (70)

#### SPECTRUM REPAIRS

48k Spectrum faults .....	£12.00
48k Spectrum KB faults .....	£12.00
416k memory IC .....	£10.00
416k memory IC .....	£10.00
200 cps .....	£2.10

ALL PRICES INCLUDE VAT AND POSTAGE

#### RA ELECTRONICS

131 London Road South,  
Lowercott, Suffolk NR3 9AX  
Tel: 0502 86289 (907)



## PLAY AWAY LTD

The **ONLY** way to buy software  
for your home computer.  
Look at this week's amazing  
**AMAZING OFFERS!**

Atari ST	R/R	S	Spectrum	R/R	S	Commodore 64	R/R	S
Samurai	24.95	17.50	Jedward	7.95	2.99	Logan Rider	8.95	4.99
SPL Football	24.95	17.50	Wildcats	8.95	2.99	Endless Race	8.95	4.99
Wohlgemut	24.95	17.50	Smashthru	8.95	2.99	Delta	9.95	4.99
Hick-Harris Guide	24.95	17.50	10th Frame	8.95	4.99	Tiger Mission	9.95	4.99
Leather Goddesses	20.95	20.99	Crash Smashes	9.95	2.50	10th Frame	8.95	4.99
Musik Studio	20.95	20.99	Legend of Kaga	7.95	2.99	Broderbund Classic	9.95	4.99
Paintworks	20.95	20.99	Trivial Pursuit	14.95	6.99	Last Ninja	9.95	6.50
Super Cycle	24.95	17.50	Deep Stroke	9.95	2.99	Bomb Jack II	9.95	3.99
Leadsheet	24.95	17.50	Highlander	7.95	2.99	Xenious	9.95	2.99
Chang Wrestling	24.95	17.50	Space Harrier	7.95	2.99	Mutants	8.95	3.99
Balance of Power	20.95	20.99	Barbarian	9.95	6.75	Strike Force Cobra	3.95	1.99
Mean 18	20.95	20.99	Paperboy	7.95	4.99	Breakthru	9.95	2.99
Prohibition	19.95	13.99	Solitaire 2	7.95	4.99	Trivial Pursuit	14.95	6.99
Metropolis	24.95	17.50	Need For Health	7.95	4.99	Paperboy	9.95	3.99
Xenious	24.95	17.50	Mutants	7.95	4.99	Delta	9.95	5.50
Typhoon	19.95	13.99	Leadsheet	8.95	6.50	Sunstar	8.95	4.50
Akashad	14.95	8.99	Xenious	8.95	2.99	Death or Glory	8.95	4.50
Trialblazer	24.95	17.50	Top Gun	7.95	3.99	IQ	8.95	4.50
Photos	14.95	8.99	Durrell Big 4	9.95	3.99	Seperator Ping Pong	9.95	2.99
Liberator	12.95	8.95	Armistead	8.95	5.99	Supercycle	9.95	3.99
Mounting	14.95	9.99	Elite	14.95	5.99	Slip Runner	8.95	2.50
TurboGT	15.95	10.99	Threats	7.95	3.99	Vex Cruz	9.95	3.99
Super Tennis	24.95	17.50	10th Frame	9.95	4.99	Max Torque	9.95	5.50
World Games	24.95	17.50	Breakthru	8.95	2.99	Threats	7.95	3.99
Crafton + Junk	19.95	10.99	Sun Star	9.95	2.99	MSX		
Pebble Factory	24.95	17.50	Popeye	8.95	2.99	Ad Widescreen Money	7.95	3.99
Goldsource	24.95	17.50	Mercenary	9.95	3.99	Winter Games	9.95	3.99
Arbale	24.95	17.50	Top Gun	8.95	3.99	Kradcut	7.95	2.50
Strangler	24.95	17.50	American Cup	9.95	2.99	BBG		
Gold Of Thrones	24.95	17.50	Balloonix	8.95	4.99	Paperboy	9.95	6.75
Winter Games	24.95	17.50	Night Runner	7.95	1.99	Crystal Castles	9.95	3.50
Silent Service	24.95	17.50	DISC USERS 9+10 (Inclusive Business Machines)			Trivial Pursuit	14.95	6.99
Fleet St. Pub	122.72	89.95						
File Director	56.21	45.95						
The Pawn	24.95	17.50						
GATO	24.95	17.50						
Karate Kid II	24.95	17.50						

Software also available for MSX, BBC, ELECTRON, IBM, AMIGA and many others - please enquire

## The Unrivalled Play Away Ltd Service

- \* All prices are inclusive of V.A.T., packing and postage inside the UK.
- \* 24hr phone service manned from 8.45am to 5.00pm.
- \* Can't see something you want? We carry a full range of software, ANY enquiries phone Peter or Brian on 0705 696913.
- \* Excellent service available. Play Away Ltd is officially endorsed by Brian Cozt from the T.V. programme Play Away. We are established sellers of computer consumables and operate from a large and efficiently run warehouse in Portsmouth with thousands of titles instantly available under just one roof.
- \* Access + Visa credit card orders welcome - use our fast and efficient order service NOW!
- \* Overseas, European & BPO orders welcome. Europe and the rest of the world (excluding BPO) add only 75p express postage per item.
- \* Price Promise Offer - if you find someone advertising software cheaper than us, we will match them!
- \* Make Cheques or Postal Orders payable to Play Away Ltd and send to:

## PLAY AWAY LTD

Dept PCW1, Unit 14, Limberline Ind. Estate,  
Hilsea, Portsmouth,  
Hampshire PO3 5HJ.

Tel: 0705 696913. Fax: 0705 673993

All offers subject to availability

Price Promise Offer is subject to standard terms and conditions, available on request



## SPECIAL OFFERS

### Incredible Price Cuts

5 1/4" DS/DD Bulk unbranded		
10.....	<del>£6.35</del>	<b>£6.15</b>
25.....	<del>£14.99</del>	<b>£12.50</b>
50.....	<del>£26.99</del>	<b>£19.95</b>
100.....	<del>£49.99</del>	<b>£34.95</b>
150.....	<del>£96.99</del>	<b>£52.95</b>
250.....	<del>£119.99</del>	<b>£85.95</b>
500.....	<del>£219.99</del>	<b>£165.95</b>

3 1/2" DS/DD Bulk unbranded		
10.....	<del>£13.55</del>	<b>£11.50</b>
25.....	<del>£32.00</del>	<b>£28.95</b>
50.....	<del>£62.00</del>	<b>£55.75</b>
100.....	<del>£119.00</del>	<b>£109.05</b>
150.....	<del>£179.00</del>	<b>£164.75</b>
250.....	<del>£279.00</del>	<b>£271.75</b>
500.....	<del>£519.00</del>	<b>£511.75</b>

3" Maxell CF2 (10).....	<del>£25.00</del>	<b>£22.50</b>
-------------------------	-------------------	---------------

80 Capacity 5 1/4" LSB.....	<del>£9.95</del>	<b>£8.00</b>
100 Capacity 5 1/4" LSB.....	<del>£11.95</del>	<b>£11.00</b>
3 1/2" Library Cases.....	<del>£1.10</del>	<b>£0.95</b>
5 1/4" Library Cases.....	<del>£1.10</del>	<b>£0.95</b>
Disc Notchers.....	<del>£3.60</del>	<b>£3.20</b>
40 Capacity 3 1/2" LSB Lockable.....	<del>£9.95</del>	<b>£9.95</b>

All prices include VAT and postage.  
ALL TRADE ENQUIRIES WELCOME.

## M.D.S. Computer Supplies

11 Church Street, Banbridge BT32 4AA

Credit Card Hotline 10am-7pm (08206) 23477

A Division of Brocklis Enterprises Ltd.

(376)

## FLOPPY SHOP ST USER GROUP

### and public domain library

We're an independent user group set up to support the ST community. For £5 annually you have access to one of the largest software libraries in Britain along with free subscription to a club magazine. The current issue is available as part of our introduction pack which you can get free by sending a S.A.E. to the address below. We charge only £3.50 per disc including P.&P.

## Floppy Shop ST

50 Stewart Crescent, Northfield, Aberdeen

(418)

## THE COMPUTER DEPOT

205 Buchanan Street  
Glasgow G1 2JZ  
Tel: 041-332 3944



## COMMODORE +4

64K computer  
datasette  
disc drive  
joystick  
and software

★ ONLY £99.95 ★

## SCOOP PURCHASE

12in. Green Monitor  
Ferguson MMO2

★ ONLY £59.95 ★

Suitable for Commodore, BBC,  
Electron, IBM, Amstrad PC,  
Spectrum, Atari, etc.  
(Specify type of lead.)



A veritable Aladdin's cave for the computer lover  
Visit or telephone

(301)

## OL ZITASOFT WARE

**SDWIMMER**, NEW screen driver for Canon 8000 and compatibles. Also this one on ordinary screen driver, upgrades your own screen, drive, plot, text, graphics, parallel screen driver. Cheap upgrade to 8000 series. Upgrade your own screen, drive, plot, text, graphics, parallel screen driver. Cheap upgrade to 8000 series. Upgrade your own screen, drive, plot, text, graphics, parallel screen driver. Cheap upgrade to 8000 series.

**TOUCHSCREEN** a VHS tape with 3 tapes in one. VHS tape with 3 tapes in one. VHS tape with 3 tapes in one. VHS tape with 3 tapes in one. VHS tape with 3 tapes in one. VHS tape with 3 tapes in one.

**TOUCHSCREEN** a VHS tape with 3 tapes in one. VHS tape with 3 tapes in one. VHS tape with 3 tapes in one. VHS tape with 3 tapes in one. VHS tape with 3 tapes in one. VHS tape with 3 tapes in one.

Atari 800 XL / 130 XE  
Essential Utilities

## Transdisk Version 3.0

The most powerful tape to disk system for the Atari now ever better. Transfers commercial, master code, "best" cassette games in any other software to disk. Single, multi-stage and now even non standard format tapes present no problem to Transdisk. Plus, enjoy the convenience of loading and running your newly transferred program from an automatic disk menu. No other tape to disk utility for the Atari is as powerful or successful as this £119.95 inc. Supplied on disk with the Transdisk.

## The Freezer

An amazing new utility for the Atari "Freezer" programs while they are RUNNING on your computer. The Freezer takes over control and allows you to make a hard-copy of the frozen program. The back-up copy will load, and restore from the frozen point, on ANY Atari XL/XE computer, independent of the Transdisk. Disk 800 tape programs even those that are heavily protected. Easy to use - hit and key to freeze the program in memory then insert a blank disk and hit another key to save it - that's it £139.95 inc.

Send or phone for more details of these utilities.

Special offer order both programmes for £239.95

Make Cheques or P/B payable to DIGICOM and send your order to:

DIGICOM

170 Bradwell Common Boulevard, Milton Keynes, Bucks MK13 8BG. Tel: 0908 963708. (121)

## MONEY FROM YOUR AMSTRAD PCW

Got a PCW? Or just thinking of buying one? Either way you can't go wrong, the PCW is the perfect small business computer. If you realise, though, just how many ways there are of making money with money? I don't mean running your own business, but carrying out simple tasks for other people. Tasks which are very well paid.

Experienced user or beginner, we can show you how to make real money, full or part time, providing straightforward computer services. No programming, no hard selling, no hassling, and you operate at home. Companies spend more every year on computer services. Don't miss your opportunity in this exciting and growing field!

Write or phone for free details of this complete business plan specifically for the Amstrad PCW owner.

## POINT ONE PUBLISHING

Box 34, St. Bees, Cumbria CA27 0BN

Tel: 0946 822 242 (109)

## AMAZING UNBELIEVABLE VALUE

Here it is, the new price for the

ATARI 520 STFM - £275 (inc. VAT & carriage)

Call Theta Computers 0943 816133

2nd Floor, 126 Belling Rd, Ilkley, West Yorkshire, MAIL ORDER (139)

**SPECTRUM AMX**, mouse, micro-drive, interface 1, cartridges, Art Studio. Full set of "input" magazines and binders. All in excellent condition, £60 or offers. Tel: 091 5226115.

**ATARI SF354**, 500K disc drive, £60. Gauntlett, Wandersley £9. Casio CZ101 synth, for ST £175. Buyer collects. Tel: (Chris) Witney 5382 after 6pm.

**C64**, 1541 disc drive, tape deck, books, cartridges, joysticks, £400 software including Infocoms. Worth over £900. Sell £330. Quick sale wanted. Ring 0298 77641.

## RIBBONS

## ALADDIN

FABRIC RIBBON CASSETTE RE-INKING

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

Tel: 0890 50965 (208)

**SPECTRUM AMX**, mouse, micro-drive, interface 1, cartridges, Art Studio. Full set of "input" magazines and binders. All in excellent condition, £60 or offers. Tel: 091 5226115.

**ATARI 130XE**, 800XL, 1050 disc drive, 1010 recorder, touch tablet, joysticks, dust covers, over 60 software titles, disc storage box, £260 the lot. Tel: 0274 675739 after 6.30pm.

**AMSTRAD CPC 464** without monitor or modulator, £250. Original software including Laser Basic, Spinidzy plus £60 Amstrad magazines plus joystick. Would cost £450, sell for £130. Tel: 01-520 1639 ask for Kieran.

**CBM 128** + C2N + £600 worth software and joystick + mags, all worth £900, will sell for £450 o.n.o. Ring Peter on Mon-Sat, after 6pm on 01-622 7244. Cash only please.

**ATARI SF354**, 500K disc drive, £60. Gauntlett, Wandersley £9. Casio CZ101 synth, for ST £175. Buyer collects. Tel: (Chris) Witney 5382 after 6pm.

**C64**, 1541 disc drive, tape deck, books, cartridges, joysticks, £400 software including Infocoms. Worth over £900. Sell £330. Quick sale wanted. Ring 0298 77641.

**AMIGA 1000 512K**, excludes monitor, includes keyboard, mouse and Leaderboard game. Kickstart 1.1, 1.2 and introduction book. Sell all £450. Tel: 01-627 2489.

**BBC B**, two disc drives, data recorder, joystick adaptor, AMX mouse, software for disc, tape, games, utilities, AMX and other Roms, all good condition, £500 o.n.o. Tel: 04024 44740.

**ATARI 520 ST** with one 1 megabyte disc drive and one 1 meg drive, high res. colour monitor, over £275 of software, blank discs and stand, £500 o.n.o. Tel: 01-627 2489.

**SPECTRUM EXPANSION SYSTEM**. Two microdrives, good condition. Eight cartridges, £30. Enclose S.A.E. P. Davies, Victoria Inn, Bradwell Village, Milton Keynes MK13 9AQ.

## ATARI ST SOFTWARE

Need not be expensive  
Public domain software could be just what you need.

I have a full range of utilities, games, demo's etc, at just £3.00 per disc.

No fees or membership, send a stamp for list to:

**SOFTVILLE**  
55 Highfield Avenue  
Waterloooville  
Hampshire  
Telephone: 0705 266509 (364)

## ATARI ST PUBLIC DOMAIN

Why reinvent the wheel? We have a large selection of languages, demo's, utilities, comm's and games etc, available. A stamp for our list will save you hours of frustration. No membership fees.

Discs from £2.50  
**MCSOFT**

9 Abingdon Gardens, Bath,  
Avon BA2 2UY (178)

## C128 DATAFILE

Up to 1000 records, 8 fields, fixed, file search, sort, merge, memory, record, disc drive + computer status, printers + more home features. A complete low package for £139, disc only. Send cheque/P.O. to:

**K. J. Software**, 78 Wood Avenue,  
Folkestone, Kent. (364)

**ATARI ST OWNERS**. Write now for a free copy of our latest newsletter and public domain library catalogue. The ST Club (PCW487), PO Box 20, Hertford SG13 8NN.

**COMMODORE 64**, 1541 drive, C2N cassette, 1702 monitor, modern, Centronics interface and £100s of original software, £450 o.n.o. Tel: 01-435 8185 after 6pm.

**AMSTRAD CPC 6128**, colour monitor, extra drive, printer, many extras, £550 o.n.o. Tel: 01-554 1846.  
**C64** + data recorder, 1541 drive, MPS 801, software to the value of £1000. Many extras including guide disc, £320 o.n.o. Tel: 0421 214561 evenings.

**ATARI ST OWNERS** - Write now for a free copy of our latest newsletter and public domain library catalogue. The ST Club (PCW487), PO Box 20, Hertford SG13 8NN.

**AMIGA 1000 512K**, excludes monitor, includes keyboard, mouse and Leaderboard game, Kickstart 1.1, 1.2 and introduction book. Sell all £450. Tel: 01-627 2489.

**BBC B**, two disc drives, data recorder, joystick adaptor, AMX mouse, software on disc and tape, game utilities, AMX and other Roms, all good condition, £500 o.n.o. Tel: 04024 44740.

**ATARI 520 ST** with one 1 megabyte disc drive and one 1 meg drive, high res. colour monitor, over £275 of software, blank discs and stand, £500 o.n.o. Tel: 01-627 2489.

**SPECTRUM EXPANSION SYSTEM**. Two microdrives, good condition. Eight cartridges, £30. Enclose S.A.E. P. Davies, Victoria Inn, Bradwell Village, Milton Keynes MK13 9AQ.

## COMPUTER WORKSHOP

PICK UP YOUR AMSTRAD OFFICE THIS SUMMER

PC 512 512K twin drive, mono monitor, printer, word processing and Supercalc 3 software:

**£699** + VAT, £10 postage  
OFFER CLOSING 31 AUGUST 1987 (411)

## BLANK CASSETTES

WITH LABEL CASES

20	C10	C15	C20
20	750	750	750
50	1500	1500	1500
100	2900	3000	3100

Fully Inclusive (I.C.D. £1 extra)

## DISKS

10 5 1/2" DS/DD  
£6.50 inc. case

10 3 1/2" SS/DD  
£16 inc. case

10 3 1/2" AMSOFT  
£26 inc. case

## MEMOTECH COMPUTERS AND ACCESSORIES

MTX 512 COMPUTER	£43.00
8010 PRINTER	£150.00
RS232C	£30.00
PASCAL ROM	£30.00
SPECIALATOR ROM	£30.00

1 mb. DISK DRIVE & INTERFACE £160  
1 mb. DISK DRIVE & INTERFACE £160

All the above prices are fully inclusive. We stock the entire Memotech Range. Order! Telex to:

**UK HOME COMPUTERS**  
82 CRECHFIELD AVE, SWINDON,  
WILTS SN1 2HT

24-hr Phone Service 0793 856034

# M CRO SLE



## 1 THE SOUTH EAST

### SOUTHEND-ON-SEA

## ESTUARY PERSONAL COMPUTERS

Commodore's Amiga A500 available NOW. Call for price.  
Buy the Atari STFM at the new price - only £299 inc. VAT.  
Software at discount prices.

**Victoria Circus Shopping Centre**  
(escalator from railway station)  
Southend on Sea

**Tel: (0702) 614131**

(259)

## 3 SCOTLAND

### GLASGOW

THE BEST IN SCOTLAND FOR DISCOUNT

### CITY CENTRE COMPUTERS

136 Ingram Street, Glasgow G1. Tel: 041-552 4222

### SUMMER BARGAINS AT LOW PRICES

AMIGA A500 .....	£490
AMIGA 1000 + MONITOR 512K .....	£930
ATARI 520 STM + 1 MEG DRIVE .....	£365
ATARI 520 STFM .....	£340
ATARI 1040 ST .....	£525
ATARI 1 MEG DRIVE .....	£160

Also available, Atari and Amiga add-ons

### SPECIAL OFFER: 15% OFF ALL SOFTWARE

PUBLISHING PARTNER .....	£130
C64 AND VIC POWER SUPPLIES ONLY .....	£10.50

### REAL BARGAIN:

3 1/2" DS/DD DISCS .....	£20 for 20 or £45 for 50
5 1/4" DS/DD DISCS .....	£19 for 50

Huge discount for bulk orders

Above prices do not include postage for mail order

## LONDON

### DIGITAL SHADES LTD

★ Atari ST Special Offer!  
Atari 520 STFM plus starter kit  
Now ONLY £250.00  
Amiga A500 plus starter kit  
and modulator £499.00

Mail order hotline  
(01) 471 7969

9 Selsdon Road, Upton Park  
London E13 9BY (387)

### TRIANGLE TELEVISION

The Amiga specialist

- ★ A500 and A2000
- ★ External Drive £148 inc. VAT
- ★ Full range of peripherals
- ★ Full range of software
- ★ Video/Graphic Specialists
- ★ High Point now in stock - £67.85 inc. VAT

Phone for details  
191 Brookwood Road,  
London SW18 8DQ  
Tel: 01-874 3418



## GLASGOW

### GLASGOW COMPUTER CENTRE

Atari appointed dealer  
and Service Centre

Specialists in Atari ST Computers

VIRGINIA GALLERIES

(1st Floor)

33 VIRGINIA STREET

GLASGOW G1 1TU

TEL: 041-552 1522 (176)

## EDINBURGH

### The AMIGA CENTRE SCOTLAND

Commodore Business Centre

Amiga Specialists since 1985

Amiga A500 and A2000 now available.  
Technical and software support to our  
customers. Full range of AMIGA software and  
peripherals.

Send S.A.E. for our software catalogue

4 Hart Street Lane  
Edinburgh EH1 3RN

Tel: 031-557 4242 (24 hrs.) (379)

## ADVERTISING RATES FOR MICRO-FILE

Semi Display  
Lineage

£8 per single column centimetre (+VAT)  
35p per word (+VAT)

CALL SUSANNAH KING or ROBERT COLE on 01-437 4343 FOR SEMI DISPLAY ADVERTISING

## 520 STF

This is ATARI's entry level computer it is a one box solution ie built in power supply, disc drive and keyboard. Main features are: 68000 processor (16/32 bit 8mhz), 192kbyte operating system, 512kbyte of ram, 3 channel sound chip, built in floppy disk drive, catronics printer port, RS232 serial interface, MIDI interface, joystick and mouse interface, colour and high resolution monitor output plus V.T. interface making this the best home/office portable computer worth buying.

**520STFM PLUS MOUSE & A FREE GAME** ie AIRBALL BARBARIAN LEON CHESS GAUNTLET GOLDWINNER LEON BOARD ARCADE CROSS SILENT SERVICE STARGUARD THE PAWN ETC

**£299**

512KBYTE RAM UPGRADE ONLY £89

## 1040 STF SYSTEMS

This is ATARI's middle range keyboard, it has the full IMEGABYTE OF RAM PLUS 8 DOUBLE SIDED DISK DRIVE built in and an internal switchmode power supply but no TV modulator so it may only be used with monitors or TV's with euroconnectors for direct RGB input.

1040STF KEYBOARD WITH MOUSE:

**£464.00**

1040STF MONO SYSTEM WITH MOUSE:

**£558.00**

**A.S. & T. SPECIAL OFFERS:**  
FREE EXTERNAL SECOND DRIVE  
WITH FOLLOWING PACKAGES:

1040STF SYSTEM & SIGNUM £829

1040STF SYSTEM & VIP GEM £826

1040STF SYSTEM & SAGE

ACCOUNTANT PLUS £826

1040 STF SYSTEM & PC DESIGNER

**£795**

## 520STFM MEGAPAC

This is a professionally upgraded 520STFM keyboard containing an extra 512kbyte of RAM and an external double sided disk drive.

**£449.99**

The MEGAPAC MONO SYSTEM:

**£549.99**

520STFM SYSTEMS WHILE STOCKS LAST  
SYSTEM A, CONTENTS 520STFM, MOUSE,  
SF354, SM28 & 1ST WARD £419.99

SYSTEM B, AS A BUT FD600 INSTEAD OF  
SF354 AND EXTRA 512K OF RAM, £599.99

SUPERPAC, CONTENTS 520STFM, MOUSE &  
FD600 £349.99

## MEGA ST SYSTEMS

NOW AVAILABLE THE FIRST HIGH PERFORMANCE DESKTOP COMPUTER TO OFFER YOU 2MEGABYTES OF RAM FOR LESS THAN £1000. The added features over the 1040STFM are a professional calculator keyboard, battery backed clock, faster memory block transfer (blitter chip), forward facing drive and fan.

In keeping with A.S. & T.'s policy of offering you the best package deals we will supply every MEGA ST2 system with a FREE second IMEGABYTE switchmode disc drive, for MEGA ST2 purchasers the second drive will be available for only £25.

PRICES:  
MEGA ST2(MONO) SYSTEM

**£999.95**

MEGA ST4(MONO) SYSTEM

**£1299.95**

FOR COLOUR INSTEAD OF  
MONO ADD £185.

WE STOCK A COMPLETE RANGE OF SOFTWARE, PERIPHERALS, ACCESSORIES AND SPARES ie:  
SH204-E599, SUPRA 20MEG-E599 HARD DISC DRIVES, PHILLIPS CM6833 COLOUR MONITORS AND SM125 MONO MONITORS. COMPREHENSIVE RANGE OF PRINTERS, BOOKS, SOFTWARE AND DIGITISERS.

FD600 twin doubled sided disk drive and psu £218

SF354 singled sided drive with psu (new stock item) £90

SF314 doubled sided drive with psu £185

DISK DRIVE UPGRADE KITS NO SOLDERING

520STFM1040STFM EXTERNAL DRIVE B £99

520STFM EXTERNAL DRIVE A (IMEG) £99

520STFM EXTERNAL DRIVE A NEEDS A KNUIFE AND

DRILL £89

## ORDERING:

All prices include VAT where applicable, at 15%, but not postage. Payment with order, except for GOVERNMENT or EDUCATIONAL AUTHORITY OFFICIAL ORDERS. Payments may be made by cheque, giro, postal order, registered credit or credit card (ACCESS, VISA & CONNECT) made payable to A.S. & T. Ltd.

## POSTAGE:

1. SMALL ITEMS UP TO 100g BY R/D POST £2.00

2. METAL CASES AND HEAVY ITEMS BY PARCEL POST £3.00

3. BOOKS, DISCS, MODEMS & MIDI INSTRUMENTS £5.00

4. COMPUTERS, PRINTERS & MONITORS BY COURIER £7.00

TELEPHONE 0702 510151 (LINES)

ADVANCED SYSTEMS & TECHNIQUES

UNIT 32/33 RUTHERFORD CLOSE

EASTWOOD INDUSTRIAL ESTATE

LEIGH-ON-SEA

ESSEX SS9 5LQ

SHOWROOM OPEN SIX DAYS A WEEK

MONDAY-FRIDAY 0900 TO 1700, SAT. 1000 TO 1700

24 HOUR BULLETIN BOARD REOPENED ON

0702 512426

SEE PARCEL & MEDIAN C SUPPORTED PLUS PC SOFTWARE.

## HAYES

### GOEL COMPUTERS

★ We deal in the whole range of computers from PCs to Spectrums

★ Atari STFm now at the new price - **£275**

We are now also at 1000 Uxbridge Road, Hayes Tel: 01-573 2726

45 Boston Road, London W7 Tel: 01-579 6133 (H16)

## FARNHAM

### FARNHAM COMPUTERS

We are dealers for AMSTRAD

ACORN ATARI ST

For your computer, software and peripherals requirements.

Call us for prices:

1 South Street, Farnham Surrey.

Tel: 0252 723107 (327)

## 2 THE MIDLANDS AND NORTHERN ENGLAND

### LEICESTER

### EKRA TECHNOLOGY FOR AMSTRAD

● The Full Range ● Immediate Delivery ● Lowest Prices (see VAT) reg. Mail Order ● Authorized Dealer ● Competitive Services Training ● Professional Consultancy

Amstrad 1215-1296 Dual Drive Mono £699.50 Amstrad PC1500 280k hard disc colour £1099.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

Amstrad PC1500 280k H drive mono £799.50 Amstrad PC1500 280k H drive mono £799.50

## 2 THE MIDLANDS

### MANCHESTER/HINCKLEY

### COMLEX

SPECIAL PRICES WITH THIS AD!

AMSTRAD SPECIALS

Amstrad 1540 20MB Tandon £399

Including twin floppy, Superdisk, 1 year warranty - VAT - phone for offers not listed.

#### AMSTRAD PC

100 Mono £242 20MB Upgrade for Amstrad PC (disk if required) £345

150 Mono £252 Amstrad 1512 Mono (20MB) £499

150 Colour £262 640K Memory £780

200 Mono £262 Amstrad 2012 Mono (20MB) £499

200 Colour £262 640K Memory £780

200B Mono £262 Amstrad 2012B Mono (20MB) £499

200B Colour £262 640K Memory £780

200B Mono £262 Amstrad 2012B Mono (20MB) £499

200B Colour £262 640K Memory £780

200B Mono £262 Amstrad 2012B Mono (20MB) £499

200B Colour £262 640K Memory £780

200B Mono £262 Amstrad 2012B Mono (20MB) £499

200B Colour £262 640K Memory £780

200B Mono £262 Amstrad 2012B Mono (20MB) £499

200B Colour £262 640K Memory £780

200B Mono £262 Amstrad 2012B Mono (20MB) £499

200B Colour £262 640K Memory £780

200B Mono £262 Amstrad 2012B Mono (20MB) £499

200B Colour £262 640K Memory £780

#### ATARI

520STFM £399 1040STFM £599 520STFM + mono monitor £599

#### COMMODORE

Amiga 500 £199 Amiga 1000 £399 Amiga 2000 £599

#### GOVERNMENT AND EDUCATIONAL ORDERS WELCOME.

#### EXPORT ENQUIRIES WELCOME

STANDARD DELIVERY £5 AND NEXT DAY £5.50 - ADD 15% TO ORDER TOTAL

(Amkfax House, 28 Bradgate Road, Hinckley LE10 1LA)

(0455) 635553, Manchester 061-976 3763 (342)

### ★ ELM COMPUTING ★

Large stockist of Amstrad, Commodore, Amiga. Used & quality second hand goods. Always for sale. Ample software always in stock NOW!

Awaiting new prices for ST.

Enquiries welcome. Stock list always available, always changing.

Send S.A.E. stating interest to:

3C York Avenue

Cleveleys

Lancashire FY5 20G

Or phone hotline 0253 852 882

(Amkfax House, 28 Bradgate Road, Hinckley LE10 1LA)

(Call for Pete Wood). (372)

### CLEVELEYS

### LIVERPOOL

### CITY SOFTWARE

Specialists in:

AMSTRAD

COMMODORE

ATARI

SOFTWARE

AND HARDWARE

66 Lime Street,

City Centre, Liverpool

Tel: 051-708 7100 (283)



## Your complete guide to all the software released this week

### Amstrad CPCs

**Program Centurions Type Arcade**  
Price £8.99 tape, £14.99 disc  
**Supplier** Reaktor, 68 Long Acre, London WC2E 9JH.



**Program Death Wish 3 Type Arcade**  
Price £9.99 tape, £14.99 disc  
**Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

See panel for comment.



**Program Athena Type Arcade**  
Price £8.95 tape, £14.95 disc  
**Supplier** Imagine, 6 Central Street, Manchester M2 5NS.

**Program Joe Blade Type Arcade**  
Price £1.99 **Supplier** Players, Callera Park, Aldermaston, Berks RG7 4QW.

**Program Lucasfilm 4 Type Arcade**  
compilation Price £9.99 tape, £14.99 disc  
**Supplier** Activision, 23 Pond Street, Hampstead, London NW3 2PN.

Collection of Lucasfilm's four games using fractal graphics, which, if I remember correctly, were supposed to make the industry gasp in awe.

The pack comprises *Rescue on Fractalus*, *Ballblazer*, *Koronis Rift*

and *The Eidolon*, all pretty good games in their own right. A welcome addition to the compilation field.

### Atari ST

**Program Cyber Studio Type Graphics system** Price £89.95  
**Supplier** Electric Distribution, 8 Green Street, Willingham, Cambridge CB4 5JA.

Package licensed from US company Antic, comprising CAD 3D 2 and Cybermate.

CAD 3D is a graphics system. Cybermate an animation program which will move, rotate and view from any perspective images created with CAD 3D.

Intended for use in product design and scientific models rather than as an alternative to Degas.

**Program Autoduel Type Arcade/racing** Price £24.95  
**Supplier** Origins, 2 Market Place, Tetbury, Glos.



**Program Championship Baseball Type Simulation** Price £24.95  
**Supplier** Activision, 23 Pond Street, Hampstead, London NW3 2PN.

**Program TNT Type Arcade** Price £24.95  
**Supplier** Infogrames, Mitre House, Abbey Road, Enfield, Middlesex.

Version of *Commando* on the ST with full screen scrolling. Excellent graphics in pretty pastels and subtle shades.

### Commodore 64

**Program Death Wish 3 Type Arcade**  
Price £9.99 tape, £14.99 disc  
**Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

See panel for comment.

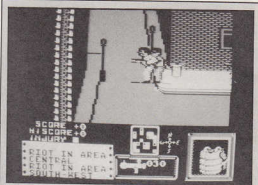
**Program Athena Type Arcade**  
Price £8.95 tape, £12.95 disc  
**Supplier** Imagine, 6 Central Street, Manchester M2 5NS.

**Program Last Mission Type Arcade**  
Price £9.99 tape, £14.99 disc  
**Supplier** US Gold, Units 2 and 3, Holford Way, Holford, Birmingham B6 7AX.

**Program Centurions Type Arcade**  
Price £8.99 tape, £14.99 disc  
**Supplier** Reaktor, 68 Long Acre, London WC2E 9JH.

**Program Lucasfilm 4 Type Arcade**  
compilation Price £9.99 tape, £14.99 disc  
**Supplier** Activision, 23 Pond Street, Hampstead, London NW3 2PN.

See Amstrad CPCs for comment.



Law and order has collapsed, vicious gangs roam the streets terrorising the populace. There's only one man who can rid New York of the scum, Paul Kersey, the ageing vigilante, played listlessly by Charles Bronson in the film *Death Wish 3*.

This time you play the role of Kersey in Gremlin's computer version of the film, and are charged with gunning down all the worthless trash on the streets. The main target for your magnum, pump action shotgun, machine gun or rocket launcher though, are the gang leaders who lounge inside the buildings.

The action is presented sideways on, with gun fodder running on from either side, which presents problems when moving around in a three dimensional environment. Instead of having roads that lead straight up the screen you change your orientation so that even if you are now facing north you still run from side to side in an east-west direction. Not a good system, compounded by the squidgy little map and compass.

The main thrill in this game is, of course, the mindless violence. The rocket launcher, which blows people up and leaves a pool of their bits on the floor, is particularly impressive, the sound effects don't match the action. There's nothing that sounds remotely like a gun and there isn't even any squealing from the victims when they're being blown away.

Possibly the most tasteless aspect of this very tasteless game, are the hookers who wander on screen, pause, then lift their skirts and scratch their bottoms.

It's true to say that the game is a faithful interpretation of the film. After 15 minutes the gratuitous cartoon violence rapidly pales leaving only a weak and plotless excuse for entertainment.

Duncan Evans

**Program Death Wish 3 Type Arcade** Price £7.99 Spectrum, MSX £9.99 tape, £14.99 disc  
**Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.



**S**entinel is one of the few games out this year which can make some sort of claim to originality. Like many games that offer something different and don't fall into a recognised category, it has attracted fanatical devotees and those utterly immune to its appeal in about equal quantities.

Released on the Firebird

Gold label, it's due out on the Atari ST in October.

Sentinel is based on a set of landscapes over which the sentinel itself is constantly watching. The sentinel rotates and when its beam catches you it will begin absorbing your energy, until you have none left and you die.

That energy is created by absorbing trees (if this sounds

## The watcher on the shore

surreal, I make no apologies, it is surreal) synthoids and boulders.

Your task is primarily to stay alive, escaping from the sentinel's beam and creating as much energy for yourself as you can. Ultimately, the idea is to absorb the sentinel itself and any of the sentinel's sentries you come across.

The game has nothing to do with fast all-out action, and much to do with tactics, and logical thinking.

As you can see from the screen shot, the Atari ST Sentinel uses near identical graphics to the 8-bit versions. Sound effects, too, remain much the same. This is a straight conversion, rather than a souped-up enhancement designed to

stretch the ST to its technical limits.

However, there is one major difference which helps considerably once you've got going. Pressing the Help key while your cursor points at the sky will give you a bird's eye view of the current landscape.

Sentinel may well be a slow starter, even an acquired taste, but it provides a refreshing change from all those Rambo playalikes and pixies.

**Christina Erskine**

**Program Sentinel Micro**  
Atari ST, available October  
**Price** £19.95 **Supplier** Firebird, 74 New Oxford Street, London WC1.

## Reaching for the skies

**O**dd company, Cascade. Their original ACE was one of the best combat flight simulators for the Commodore 64, and was followed by the unusual *Skyrunner*, which I liked but apparently no-one else did.

Now comes ACE 2 and, unfortunately, I'm the "no-one else" this time. I don't like it.

The game is set up as a two-player air-to-air combat game - simulator seems like too strong a word for it - but it includes the essential option of playing against the computer.

And here lies the first and most irritating problem. ACE 2 supposedly allows you to set any of 20 skill levels for the computer but I found this ranged from dying immediately, to dying almost immediately.

Most of this difficulty arises from the crude simulation and lack of controls. For example, although my computers were telling me that the enemy aircraft was out of range, I was

being peppered by its heat-seeking missiles.

If our boys are facing the enemy in planes like this a) they're not being paid enough, and b) we're in big trouble if the Luxembourg airforce decides to take us on.

There are no landings or take-offs, no flap control, no undercarriage to worry about, which makes for a lousy flight sim but actually makes little difference since you have no time to worry about anything except the missiles screaming at you.

There are two scenarios in which you either take on another plane, or try the longer mission which involves killing the other plane then knocking out a ground installation. I can't tell you what the ground installation is like because I never lived long enough.

The graphics are poor; a plain slab of dark blue for the sea, a plain slab of light blue for the sky, and a plain slab of yellow for the land.

The game plays reasonably well as a two-player game, and to give a little credit where it's due, it is a much better game than the appalling *Top Gun* licence.

However, it suffers the usual fault of two-player games in that single-player versions rarely work well.

Real fans of flight simulation will scorn it.

**Peter Worlock**

**Program ACE 2 Type**  
Arcade **Price** £14.95 disc,  
£9.95 cassette **Supplier**  
Cascade, 1-3 Haywa Crescent,  
Harrogate HG1 5BG.



# NEW RELEASES

**Program ACE 2 Type** Flight simulation **Price** £9.95 tape, £14.95 disc **Supplier** Cascade Games, Harrogate, N Yorks

See page 42 for comment.



**Program Implosion Type** Arcade **Price** £9.95 tape, £14.95 disc **Supplier** Cascade Games, Harrogate, N Yorks



Implosion has been produced by Cascade in association with US company Mindscape, which has been bringing out some pretty nifty titles over the last six months or so.

This is a multi-screen, multi-colour, multi-sound, multi-scrolling shoot 'em up.

**Program Classix 1 Type** Compilation **Price** £9.99 tape, £14.99 disc **Supplier** The Edge, 36-38 Southampton Street, London WC2E 7HE.

Latest in the currently fashionable compilation stakes is The Edge's *Classix*, featuring Bobby Bearing, Brian Bloodaxe, Quo Vadis, Wizardry and Firequest.

from the forthcoming games consoles up to the Amiga. It sits most happily at the gamesy end of the market.

**Program Hardball Type** Simulation **Price** £24.95 **Supplier** US Gold, Units 2 and 3, Holford Way, Holford, Birmingham B6 7AX.

## IBM PCs and compatibles

**Programs Shogun Type** Arcade adventure **Price** £19.95 **Supplier** Virgin Games, 2 Vernon Yard, Portobello Road, London W11.

Game based on James Clavell's book of the same name, based in the Japan of 1600, and already available on CPCs and Commodore 64.

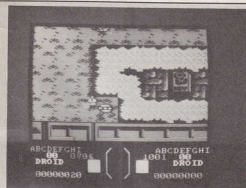
Shogun is a neat example of what might be termed the old fashioned arcade adventure.

Choose a character to play from a cast of aristocrats, peasants, samurai warriors, priests, bandits, or Blackthorne, hero of the book. Re-

## Commodore Amiga

**Program Super Huey Type** Arcade **Price** £19.99 **Supplier** US Gold, Units 2 and 3, Holford Way, Holford, Birmingham B6 7AX.

Super Huey is now available on the widest range of machines possible.



Combine a Saturday morning cartoon, *Druid* and the extra weapon aspect of *Nemesis* and what is the result? *Centurions*, the latest Ariolasoft offering on the Reaktor label.

The game plan, for what it's worth, let's you assume the role of any of the three centurions, which you must guide through land, air and sea in a bid to stop Doc Terror from stealing cases of some nasty chemical. To do this you must find the various block keys that let you into certain regions of the complex.

Once in you are supposed to hunt down the six pieces of the master key that will let you exit to the next building, of which there are three.

Additional interest is supplied by the extra weapons you can gain by blasting lots of the monsters (!?) that are suddenly running around, and the provision for having an extra player on screen simultaneously.

So far so bad. In play the sprite detection is laughable, the sound effects could have been done on a Peruvian nose flute, the scrolling on a reduced screen is jerky and uneven and the whole affair is unoriginal and uninteresting.

Duncan Evans

**Program Centurions Type** Arcade **Price** £8.99 (tape), £14.99 (disc) **Micro** Amstrad CPC (reviewed) **Supplier** Reaktor, 68 Long Acre, London WC2E.



## WHO'S BEHIND THE MASK?



## 'Whaddya mean, you sold the last copy?'

No doubt about it . . . bulging eyes, flaring nostrils, face contorted in rage, literally smoldering with frustration.

Another ordinary ST user has missed out on *ST Update*.

Trouble is, in its first few months *ST Update* has been a monstrous success. There's simply

no way you can be sure that there'll be a copy for you, unless you order one today.

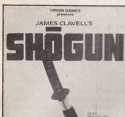
It's too late after the event. Tearing your newsagent's arm off and beating him to death isn't going to help.

Save yourself the anguish. Just ask him nicely to keep your copy safe each month.



crail followers, collect objects, get instructions from Buddha regarding your quest.

It's all very competently done, and you never know, PC owners may be crying out for this sort of thing.



## Spectrum

**Program** *Ace of Aces Type* Arcade/simulation **Price** £8.95 **Supplier** US Gold, Units 2 and 3, Holford Way, Holford, Birmingham B6 7AX.

**Program** *Mask Type* Arcade **Price** £7.99 **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

**Program** *Death Wish 3 Type* Arcade **Price** £7.99 **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

See panel for comment.

**Program** *Centurions Type* Arcade **Price** £8.99 **Supplier** Reaktor, 68 Long Acre, London WC2E 9JH.

**Program** *Lucastim 4 Type* Arcade compilation **Price** £9.99 **Supplier** Activision, 23 Pond Street, Hampstead, London NW3 2PN.

See Amstrad CPCs for comment.

## MSX

**Program** *Death Wish 3 Type* Arcade **Price** £7.99 **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

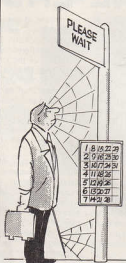
See panel for comment.



**YOU DON'T  
NEED TO  
WAIT ALL  
MONTH TO  
ADVERTISE  
IN:**

**POPULAR  
Computing  
WEEKLY**

Call **01-437  
4343**  
for details



## CHARTS

### Top Twenty

- 1 (5) Milk Race
- 2 (2) BMX Simulator
- 3 (1) Paperboy
- 4 (15) Road Runner
- 5 (-) Exolon
- 6 (7) Barbarian
- 7 (3) Run for Gold
- 8 (20) Destructo
- 9 (-) Cricket International
- 10 (10) The Last Ninja
- 11 (4) World Class Leaderboard
- 12 (11) I Ball
- 13 (19) Living Daylights
- 14 (6) Gauntlet
- 15 (8) Four Great Games
- 16 (-) Ninja Master
- 17 (-) Eddie Kidd's Jump Challenge
- 18 (-) Nick Faldo's Open Golf
- 19 (-) Tournament Leaderboard
- 20 (9) Game Over

Mastertronic  
Code Masters  
Elite  
US Gold  
Hewson  
Palace  
Alternative  
Bulldog  
Alternative  
System 3  
Access/US Gold  
Firebird  
Domark  
US Gold  
Microvalue  
Firebird  
Ricochet  
Bug Byte  
Access/US Gold  
Imagine

All figures compiled by Gallup/Computer Trade Weekly

**YOU  
COULD BE...!**

Join with the forces of MASK, skillfully commanded by the brilliant strategist Matt Trakker and combat the evil of the villainous VENOM in their quest for domination of the world.

CBM 64/128 Amstrad

Tape **£9.99** Disk **£14.99**

Spectrum 48/128 Tape **£7.99**



Gremlin Graphics Software Ltd, Alpha House, 10 Carver Street, Sheffield, S1 4FS



MASK™ and the associated trade mark are the property of Kenner Parker Toys, Inc (KPT) 1987.

**COMING SOON**

# MANUAL LABOUR

"People", observes a user manual in its introduction, "use words and expressions to convey meaning. Computers, however, convey meaning through an ordinary television set or special printer."

Leaving aside the thought that computers also use words (ie 16 bits) and expressions, this obvious nonsense is at once both patronising and confusing. Could it be that these sentences are really almost meaningless, or are we meant to divine some deep philosophical symbolism? Those who think they understand them must possess such dangerously illogical minds that even modest computer literacy is likely to be utterly beyond them. Nevertheless, they may well be able to help me to understand the following vital information concerning the QL's *Keyrow* command: "There can be two keys in any row or there can be two keys in any column but there must not be two keys which share neither a row nor a column".

Now, computers are in fact relatively easy to understand; they have a limited vocabulary of around 200 words, they become petulant when the words are not used in accordance with strict rules of grammar, and they always do exactly what they are told even though it might not be quite what was intended. The role of a computer manual is to make all this clear to the user and to explain the vocabulary and the grammar.

The standard of computer instruction manuals is, apart from a very few honourable exceptions, disgraceful. The first bar to computer literacy is supposed to be the archaic QWERTY keyboard. But even before that bridge is crossed many otherwise enthusiastic and intelligent people throw themselves into the river convinced that computers are beyond them because they opening sentences of the manual were incomprehensible.

Software instructions are little better. A well-known sprite utility gives programmers

the options of freezing, killing or dumping sprites without explaining what these powerful (and possibly fatal) activities are and what the differences between them might be. Some of the best manuals are those which have totally abandoned any link with reality. "Some murky distant planet orbiting an ancient sun had given birth to a supremely malevolent and extremely intelligent Cyborg: the Chessplayer" reveals the inlay of a perfectly humdrum chess program. Given its intelligence, it is a shame the Cyborg didn't offer to write the instructions.

All this leads to one conclusion: writing a computer manual is not easy. On the one hand, all relevant information has to be included for the benefit of the novice whilst on the other hand competent users should not be patronised. In addition, the manual must be both textbook and reference book: anyone who has tried to learn a language by reading a dictionary or checked a word's spelling by looking for it in a novel will appreciate the problems. Some people learn by example, others learn by practice, yet others learn just by reading descriptions, and all must be catered for by the same few thousand words of text.

Unfortunately, however, manuals are rarely written by journalists or teachers who might have some insight into these matters. They are written by programmers or firmware designers whose levels of English literacy are usually somewhat short of their computing skills. As a result, the excellence of their primary work is impaired by the shoddy quality of the guide which is meant to encourage and instruct (and entertain) the user. Meanwhile, authors continue to sell books which merely translate manuals into readable English.

Having had my grouse, I shall return to the instructions accompanying my new peripheral. In particular, I am advised that I must be cautious to the printer during its operation...

Mike Lloyd

## Puzzle No 271

One of the Labours of Hercules that has not been so far documented is as follows:

On a circular track, 1,000 metres in circumference, were placed 1,000 small stones equally spaced along the track at one metre intervals. Starting at one of these stones, Hercules was required to collect up all of the stones in the following manner. He was to pass over nine stones and then pick up the tenth, continuing in this way until he had picked all of them.

He would, of course, circle the track many times, and as the stones were collected he would find that he would need to run further to pass over the nine stones as required.

For example, the first stone that he collected would require him to travel just ten metres, but before being able to pick up the final stone at the end of his task, he would need to circle the track many times in order to pass over this stone the required nine times before being allowed to pick it up.

Can you determine the total distance that he must run in order to complete his task?

## Solution to Puzzle No 266

Of the 999 tickets in the lucky dip, 73 of them would result in a win. This is approximately equal to one chance in 13.685. Had the total been 13.14, the number of winning chances would have increased to 75 out of 999.

By taking each of the 999 values in turn, the program converts each number to a string variable and then sums the digits together (lines 140 to 170). Two variables are used to keep the score, WIN or LOSE. If the digital total is equal to 15 the variable WIN is incremented by one, otherwise LOSE is incremented. An array Z() is also used to keep a check on the frequency with which each of the digital sums occurs (line 190). By listing out this array, the most favourable winning scores can be determined.

## Winner of Puzzle No 266

This week's winner is M A Hall, of Mitcham, Surrey, who will receive £10.

## Rules

The closing date for Puzzle 271 is September 9.

```
100 DIM Z(27)
110 MIN=0:LOSE=0
120 FOR N=1 TO 999
130 PRINT N;
140 IF N=10 THEN GOTO 150
150 FOR F=1 TO LEN(N)+1
160 T=T+VAL(MID$(N,F,1))
170 NEXT F
180 PRINT T;
190 Z(T)=Z(T)+1
200 IF T=15 THEN WIN=WIN+1 ELSE LOSE=LOSE+1
210 NEXT N
220 PRINT WIN,LOSE
230 FOR F=1 TO 27:PRINT F,Z(F):NEXT F
```

## HACKERS



# VIP PROFESSIONAL

## THE POWER OF LOTUS 1-2-3™ ON THE ATARI ST



### 'LOTUS PLUS GEM'

Probably the most impressive program to have been released so far for the Atari ST range, VIP Professional is an extremely easy to use, integrated spreadsheet, database and graphics program which is identical both in features and commands to Lotus 1-2-3™. To give you the best program possible on your Atari ST, VIP Professional integrates the three essential applications of Lotus 1-2-3™ with the smart face of GEM. The same spreadsheet analysis, information management and extraordinary business graphics are all combined in one easy to learn, affordable package. What's more, VIP Professional not only has all the features of 1-2-3™, you can also type the same commands to do the same things. Or, better still, you can use a mouse to make it even simpler! VIP requires only one disk drive to operate and also works with a hard disk drive. It is compatible with both monochrome and colour systems. Probably the most surprising feature of VIP Professional is not its total compatibility with Lotus 1-2-3™ for the IBM PC AT costs £395 (+VAT=£454.25), whereas VIP Professional for the Atari ST range of computers is a mere £199 (+VAT=£228.85). That's nearly HALF PRICE!

INTEGRATED  
SPREADSHEET  
DATABASE  
GRAPHICS

WITH  
LOTUS 1-2-3  
COMPATIBILITY

**£199**  
(+VAT=£228.85)

### 1 SPREADSHEET

VIP Professional was modelled after the powerful, best selling Lotus 1-2-3™ program. It has every feature, every command of that program. In fact, the experienced 1-2-3™ user will feel right at home using the same keystrokes. But this version is made even easier to use by adding the user friendly face of GEM, so the beginner can use it right away. If you want to do your home budgets, financial planning, or sophisticated business inventory control or budget modelling, VIP Professional will fit the bill. And you can freely use 1-2-3™ or VIP Professional files created on other computers in VIP Professional on your Atari ST. And Professional is not only flexible, it's powerful too, with a full 1,024 row by 256 column worksheet to use with up to a massive 4Mb of memory. (Note: Lotus 1-2-3™ has only 2,048 rows).

### 2 DATABASE

VIP Professional includes a powerful data manager to arrange, store and analyse your important information. It can be used to store your home or business records and do extensive searches, sorts and comparisons. It allows up to 8192 records, with up to 256 fields and queries and 256 search criteria. The database manager can be used in conjunction with the spreadsheet commands to add greater power to the database facilities including sorting specific ranges of the database. You can also specify how you sort files, from the highest value to the lowest value (or from the lowest to the highest), or alphabetically (forwards or backwards). The graphics part of VIP Professional can be used to show trends in the database or other information. With its powerful statistical functions, it has almost limitless power.

### 3 GRAPHICS

VIP gives shape to your figures by letting you graph your data into six different types of graphs, in startling colour or black and white. Pie charts, bar graphs, stacked bar graphs, line graphs, scatter graphs and X/Y graphs. You can graph your spreadsheet or database data to give instant professional presentations. Your graphs will change instantly as you change the data. When creating a graph you may specify a main heading, a sub heading and a third title at the base of the graph. The necessary scales can be defined either by the user or automatically created. In pie graphs, the most important section of the pie can be separated from the other sections to draw attention to its importance. You may save graphs individually on disk for use at a later date. You can also print your graph on any Epson compatible dot matrix printer.

- Professional has Instant Help so you can find more information instantly.
- Calculates to a full 300 digits against Lotus 1-2-3™ which only calculates to 100.
- VIP allows for 256 Query Fields against only 32 allowed by Lotus 1-2-3™.
- VIP has a complete GEM interface, for ease of use, unlike the text of Lotus 1-2-3™.
- VIP offers different fonts and has an on-off cell grid. Not found in Lotus 1-2-3™.
- VIP supports greater memory and larger spreadsheets than Lotus 1-2-3™.
- VIP graphs and worksheet can be viewed together. Pie charts can be exploded.
- VIP can accept any WKS files from Lotus 1-2-3™ without modification.
- VIP displays all spreadsheet information in user-sizeable GEM windows.
- VIP can be manipulated using either the keyboard or the user friendly mouse.
- VIP is currently available for the Amiga, ST and Apple IIc, Ix and IIGX.

### OFFICIAL UK VERSION

The official UK version of VIP Professional has a pound (£) sign as a standard part of its character set. Other versions have also been imported unofficially from the USA and have a dollar (\$) sign instead of a £ sign. These versions will not be supported by the UK distributors or their dealers. Ensure that the VIP you buy is the official UK version, not an unofficial import with incorrect characters.

Professional is available from Atari ST Dealers throughout the UK. If your local dealer is not here in stock, it can be obtained by mail order (P&P free) from:

**JCA SHOP Ltd, 1-4 The Mews, Hatherley Road, cup, Kent, DA14 4DX Tel: 01-309 1111**

versions made to Lotus 1-2-3™ are version 1A.

## INFORMATION REQUEST FORM

To: Silica Shop Ltd, Dept PCWK 0787, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX  
Please send me further details of VIP Professional for the ST

Mr/Mrs/Ms: \_\_\_\_\_ Initials: \_\_\_\_\_ Surname: \_\_\_\_\_

Address: \_\_\_\_\_

Postcode: \_\_\_\_\_

I am interested in the Atari ST  
I already own an Atari ST



COLLECTORS • EDITION

# CLASSIX 1



**SPECTRUM**

**8.99**

**COMMODORE**

**8.99**

**DISC 12.99**

**AMSTRAD**

**6.99**

**DISC 12.99**



